

UNIVERSAL
MODEL
AIRPLANE
NEWS

NOV.
1932.

15¢

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DORICSHAFEN G. BOMBER OVER LONDON. See Page No. 9

STEWART & CO.

Low Prices and High Quality are Responsible for the Great Demand for WOBURN KITS and SUPPLIES



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Japanese Silk Tissue Paper
Grade A: Red, white, blue, green, orange, olive brown.
2 sheets, 5c; 25c doz.

Grade B: Size 20" x 30"
Colors: White, red and green only.
5 sheets, 5c; 18c doz.

Black English Parachute. Size 20" x 30". Color: Black only.
5c sheet; 6 sheets 28c.

MICROFILM
Several times stronger than Superfine tissue, and aluminum leaf; lighter and easier to handle. Per sheet 5c.
Approximate size 8" x 12".

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1/16 O.D.	2 ft. 11c
1/8 O.D.	1 ft. 7c
3/16 O.D.	1 ft. 9c

COWLING

Open Face N.A.C.A. Type		
1 1/2" diam.	22c
1 3/4" diam.	.....	22c
2" diam.	.....	25c
2 1/2" diam.	.....	30c
3" diam.	.....	35c
3 1/2" diam.	.....	45c
4" diam.	.....	60c

DRAF RINGS

1 1/2" diam.	.....	20c
1 3/4" diam.	.....	22c
2" diam.	.....	25c
2 1/2" diam.	.....	28c
3" diam.	.....	30c
3 1/2" diam.	.....	36c
4" diam.	.....	40c

SHEET

.006	sq. ft.	12c
.008	sq. ft.	14c
.010	sq. ft.	16c
.013	sq. ft.	18c

PRIME MOVERS

Enable you to use 2, 3 or 6 elastic motors in one plane. Complete, ready to attach to any plane. For 2 elastics, ea. \$.10
For 3 elastics, ea. \$.70
For 6 elastics, ea. 1.50

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Celluloid sheet for windows on cabin planes, windshields, etc. Size $\frac{3}{4} \times 1\frac{1}{2}$, 2 for 1c, 12 for 5c.

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Colors: Red, white, blue, black, green, pink, purple, yellow.	pair	1c
1 1/2" diam.	pair	1c
1 3/4" diam.	pair	1c
1 1/2" diam.	pair	1c
1 3/4" diam.	pair	1c
3 1/2" diam.	pair	2c

PANTS, black only

Streamliners for wheels

For 3" or 4" wheel, pr. 1c.	1c
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DUMMY MOTORS, black only	1c
9 cylinder double impression	45c

1 1/2" diam.	15c
2" diam.	20c

3" diam.	.....	27c
2 1/2" diam.	.....	20c

COWLING, black only	.....	1c
2 1/2" diam.	.....	1c

Special Propeller Carving Knives

The best obtainable for carving propellers, made from tempered steel, and take a keen edge. They have a point that makes it easy to get a hollow or cup-like shape in the blade of the propeller, thereby giving it a better pull or grip on the air. This increases efficiency, speed, distance and duration. Price each 50c.

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These Kits are complete in every detail and the Models make wonderful flights.

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Stinson Mono;	Hawk P.C.E.;
S.P.A.D.;	Ansaldo;
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Seaplane Camel;	Albatross D-11;
Biplane Baby Scout;	D.H. Tiger Moth; Gloster
IV. Seaplane;	Pfalz Pursuit; Bernard Pursuit;
Fokker D-VIII;	Supermarine Racer; Gee-Bee Racer;
Laird Super Solution;	Lockheed Orion; Bellanca
Skycricket;	Curritts Hell Diver.

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15" FOKKER D-VIII Complete Kit 66c p.p.



15" HELL DIVER Complete Kit 66c p.p.



15" HAWK P.C.E. Complete Kit 66c p.p.



15" LOCKHEED ORION Complete Kit 66c p.p.



15" STINSON DETROITER Complete Kit 66c p.p.

This model has flown over 1000 feet. A winner for endurance and stability.

For 15" inch, 20c each; Plane for any 15" inch model, 10c each, 3 for 25c, 6 for 45c.

HEATH BABY RIBLET, complete kit for 7 1/2" model. Will fly 1000 feet if plans are followed.

15c p.p.

Enough materials for 2 models, 20c p.p.

2 ft. STINSON DETROITER. This model has

75c p.p.

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For 15" inch, 20c each; Plane for any 15" inch model, 10c each, 3 for 25c, 6 for 45c.

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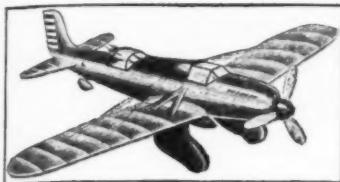
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15c p.p.

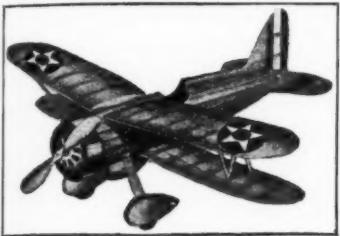
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If you want beautiful, accurate, easily-constructed and perfect-flying Models of the popular ships of the day, here they are! Thousands of Builders are getting real sport and wonderful performances out of the "Big 4" of Modeldom . . . the IDEAL-Designed 18-in. Wing Span Flying Models . . .

Curtiss A-8 Attack Plane • S-6-B Supermarine Curtiss F9C-2 "Akron" Fighter • Boeing XP-936 Pursuit



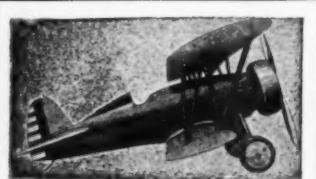
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**Three 15-in.
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These Combination Kits offer Big Value; each Kit contains all materials and full size Plans for three 15-inch Flying Models. Full fuselage type with build-up wings. Three different Kits to select from:

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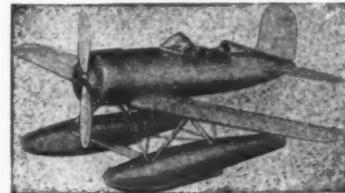
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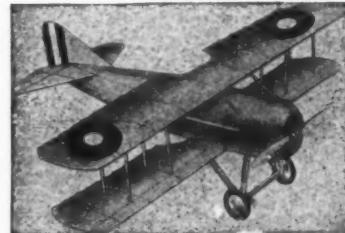
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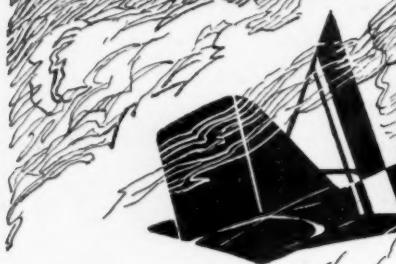
SPAD BIPLANE



VOUGHT CORSAIR

UNIVERSAL

Model



Vol. VII

No. 5

Edited by Charles Hampson Grant

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In Our Next Issue

The Airplane Catapult

Lieut. (jg.) H. B. Miller gives us the interesting points about the development of the catapulting of airplanes from battleships—Human Cannonballs. Also plans for building a model catapult.

Heath Parasol and Howard's "Ike"

Jo Howell crashes through with a neat set of plans and instructions to build a flying scale model of the new Heath Parasol as well as plans to build a solid scale model of Ben Howard's "Ike."

Learning to Soar in Germany, by Bernard Flinch, gives a graphic description of how the author learned to master the tricky wind currents of the Rhön Mountains. There is plenty for the young aviator to learn from this interesting article.

The regular course, *The Aerodynamic Design of the Model Plane*, by Charles Hampson Grant, continues to unfold the mystery of stability.

Other interesting features, Air Ways, Three View Drawings of noted planes by Stockton Ferris, Jr., and a War Ace Story by F. Conde Ott, make our Christmas number all that Santa Claus may desire for his many friends.

Order your copy of UNIVERSAL MODEL AIRPLANE NEWS from your newsdealer now, or send \$1.65 for your year's subscription to this office, 125 West 45th Street, New York City.

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All orders shipped same day as received, insuring Christmas delivery

Here it is → NEW GEE-BEE SPORTSTER

Winner of the 1932 Thompson Trophy Race piloted by Major James Doolittle at the terrific speed of over 300 M.P.H. Look at its huge, round, stubby body. Its windshields and rudder are different from last year's ship. See how its pilot sits right over the tall. National engineers have designed two perfect miniature scale models—a $\frac{1}{2}$ " scale model with $12\frac{1}{2}$ " wingspan and a $\frac{1}{2}$ " scale model with $22\frac{1}{2}$ " wingspan. Both kits contain several exclusive National features. The models are designed to build, represent faithfully just the original moulded tube frame of the big ship. The new type of cowling, further weight, non-breakable moulded material, is the same shape and color as the big ship. It is ready to cement to fuselage. Both models have the new multi-powered motor to give them good flying ability. Colors: Red and white, with insignia as shown.



BRITISH HAWKER FURY

A modern English fighter with a speed exceeding 200 M.P.H. National's $12\frac{1}{2}$ " midget is an excellent replica and a very good flier. Colors: White, black trim with British insignia. Kit complete

\$1.00
Blueprint only 25c



$25\frac{1}{2}$ " Kit contains full size \$2.50
scale blueprint and
instructions. Material com-
plete with multi powered
motor.

Plus postage 2c
Blueprint only 50c

$12\frac{1}{2}$ " Kit contains full size \$1.25
scale blueprint and
instructions. Material com-
plete with multi powered
motor.

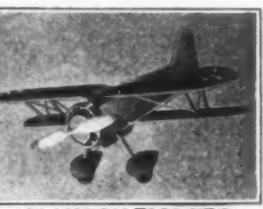
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Dec. 1st

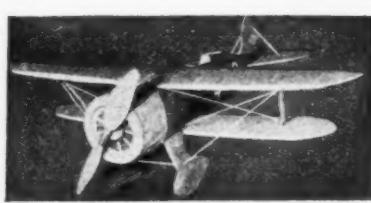
The wide interest already
shown is evidenced by the
constant receipt of entries.
Is your enrollment in?
If not, act at once.

\$160.00
in CASH



12" AKRON FIGHTER

The little Navy ship attached to the Akron. It models perfectly in a $12\frac{1}{2}$ " midget as here pictured. You will be sure to want one of these defense models. Colors: Navy blue and yellow \$1.00
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Another racing ship flown by Maj. Doolittle and which has made many records. National's complete kit assures you of building a flying scale equally as trim and beautiful as the big ship itself. Blueprint only 50c

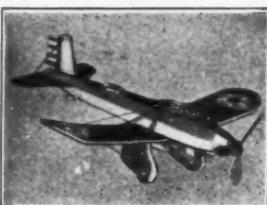
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S.E. 5	Polish P-6	Vought Corsair
Boeing P-12	S.P.A.D.	Curtiss Hawk
Bellanca	Sikorsky	Fokker D-7
Curtiss Robin	Texaco	Fokker Triplane
Curtiss Hawk	Gee-Bee	Gee-Bee
Curtiss Condor	Jarrosol	Jarrosol
Fokker D-7	Scout	Scout
Fokker D-VIII	S.E. 5	S.E. 5
Fokker Triplane	Boeing P-12E	Stinson Detroler
Gee-Bee, 1931	Boeing F-4B-3	S.P.A.D.
Hell Diver	British Super-	Lockheed Sirius
Hirth	Martini S. 6B	Texaco 13
Laird 400	Curtiss Condor	Bomber
Lockheed Vega	Bomber	Boeing
Blueprints only: 12"-25e, 18"-35e, 24"-50e		



A famous U. S. Navy plane. Kit is complete with three view, scale, blueprint and detailed instructions. All material complete to the last detail. Includes celluloid motor and wheel. Fab tissue covering. Colors yellow and green, with Navy insignia. Kit complete. Blueprint only 50c



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The new arm ship, that you have read so much about. Build a perfect model with the $18\frac{1}{2}$ " National Junior Kit. It is different than any other weapon of the air you have yet built. Colors: Green and yellow, with corrugated colored insignia. Kit complete. Blueprint only 35c.

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16" dia x 2" shaft 7/16" dia
Wgt. 2oz. 3lb & 1/2 oz



Complete with detailed blueprint, brass bearings, laminated electrical silicon steel field and armature, spring brushes, wire, shafts, screws, and all necessary parts ready to assemble. A motor for model trains, boats, and experimental development. Easy to build.

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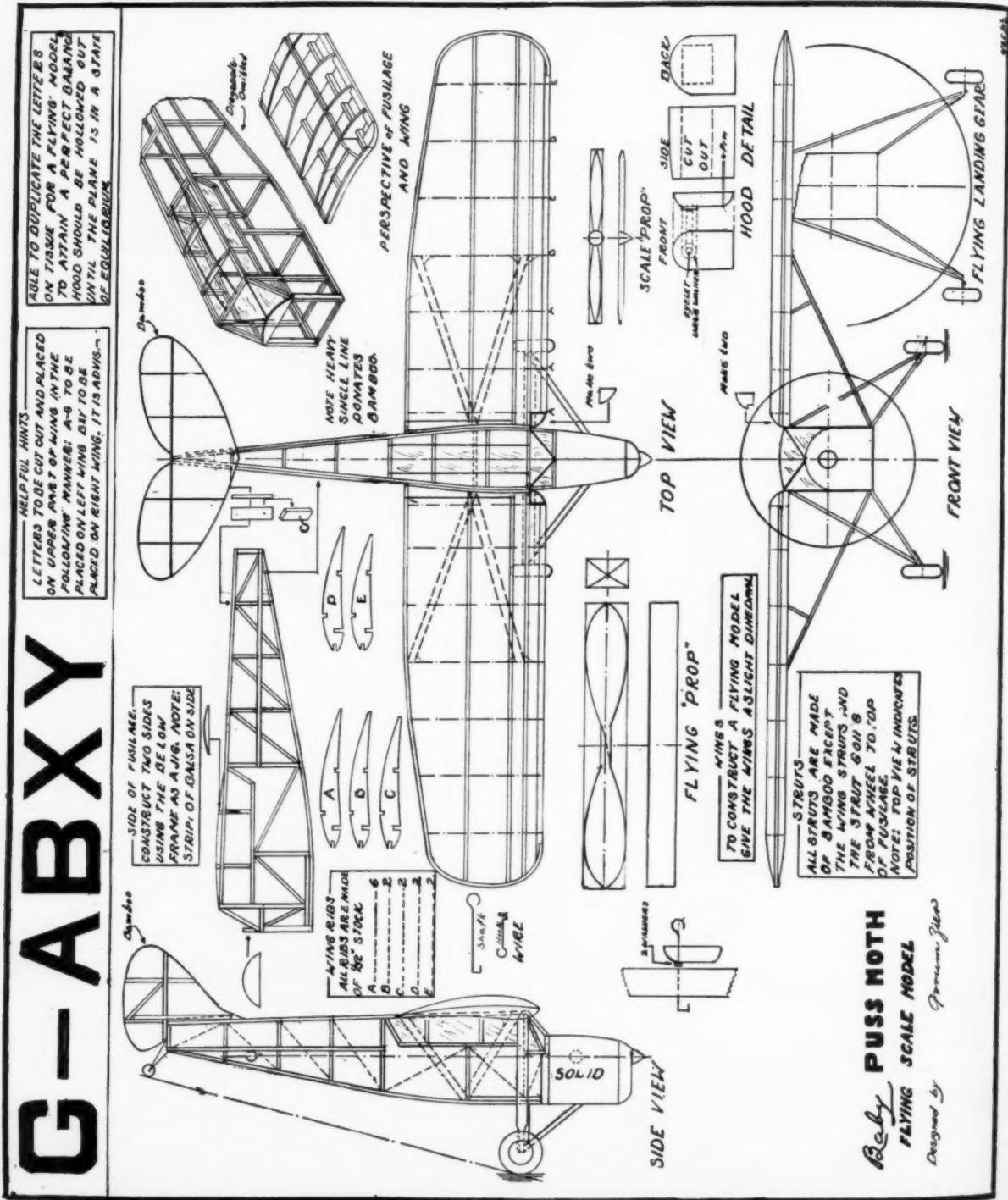
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DE HAVILLAND PUSS MOTH—Hearts Content

THIS first westward solo flight was accomplished by Captain J. A. Mollison, a British flyer, in his De Havilland Puss Moth, "Hearts Content." Captain Mollison took off from Portmarnock Strand, Ireland, and landed at Pennfield Ridge, New Brunswick, Canada, August 19, completing the flight in 30 hours 12 minutes. This marks the shortest time from land to land on a westward crossing. Leaving Canada, Mollison set his

wheels down on Roosevelt field, Long Island, New York, August 21.

The "Hearts Content" is powered with a Gypsy 3 inverted 4-cylinder air-cooled engine of 120 horsepower. The body of the Puss Moth is constructed of steel tubing, covered with fabric, the tail assembly consisting of a balanced rudder and an adjustable stabilizer. The tail wheel is of steerable type, and is controlled from the cabin.



Flying the Front for the Navy



One of the Nieuport No. 28s used by Ingalls in his many air battles

AT eighteen he was in a classroom at Yale. At nineteen he was behind the machine gun of a tricky fighting plane as Flight Commander of a picked detail. At twenty he was awarded the D. S. C. by the King of England.

This, in brief, is the dramatic war-time record of David Sinton Ingalls, late Assistant Secretary of the Navy for Aviation. As a member of the famous Northern Bombing Group, naval aviators who had left the sea to fly on the Western Front, Ingalls demonstrated amazing skill as a flyer, a leader, and a fighter. He had a talent for narrow squeaks, time after time bringing his plane back from some encounter with German airmen so riddled and torn that only a miracle of luck could have supported it in the air long enough to make a safe landing.

The story of Ingalls rightfully begins before our entrance into the World War. It begins with a group of boys in college whose practical patriotism proved wiser than that of their elders in the hour of the country's dire need.

In 1915, a number of seniors and juniors at Yale led by F. Trubee Davison, later to become Assistant Secretary of War for Aviation, turned their attention from football and hockey to a far more grim and thrilling game.

Trubee Davison had spent the spring and summer of that year working in the American Ambulance Field Service. He met many of the flyers of the gallant Lafayette Escadrille—Norman Prince, Kiffin Rockwell, Victor Chapman. Names to make any American proud. He talked with these young flyers, heard first-hand accounts of hazards, escapes, and the methods of an air service in the war.

Returning to this country, he realized how unprepared America was to take part in aerial warfare. There were few planes, even in the services, and almost no pilots. The Navy, at that time, had just thirty-eight qualified aviators. Davison talked with his classmates, injecting into them some of his enthusiasm for this splendid service. He made them see that no matter how skeptical grey-haired authorities of the country might be, the youth of the nation must be prepared to spring into the cockpits of hundreds of planes if that day should come when we must take part in the war. Eventually, he and his friends

How David Sinton Ingalls Battled His Way to Fame Over the Western Front

Lieut. (jg) H. B. Miller

organized the First Yale Unit, and set about to train themselves as flyers. They were the "Minute Men" of aviation and did this country and the Navy a splendid service.

Ingalls, younger than this group, all of whom were juniors or seniors, took a deep interest in the early struggles of the Unit to obtain backing and money to carry on their flight course. Eventually, he joined the Third Yale Unit which was trained under the auspices of the Navy.

This unit went across early in 1918 arriving in Northern France at a time when the flying man-power of the Allies was at a low ebb. Ingalls, in common with his fellow flyers, was eager to get into the fray. They had spent months of arduous preparation to fly under war-time conditions. They expected to chase Germans out of the sky the day after disembarking. Their disappointment was keen, upon arriving at their base, to find that there were no planes for them to fly.

It was perfectly natural that Ingalls and many other flyers would drift over to the French or English pursuit squadrons, adjoining the base of the Unit. Here they would watch the planes come in, listening avidly to the first-hand accounts of dog-fights over the front.

Friendships were formed between the French and English pilots and the newly arrived Americans. The Allied airmen lent their tricky little ships to the Americans. Imagine the sensations of these youngsters who had never flown single-seaters before; who had never known anything but the slow and comparatively clumsy training planes! Though it is not in the records, it is highly probable that some of these flights, surreptitiously, led (Continued on page 39)



David Sinton Ingalls, World War Air Fighter and late Assistant Secretary of the Navy for Aviation.



A Fokker D II, one of the greatest German fighting ships that Ingalls had to face.

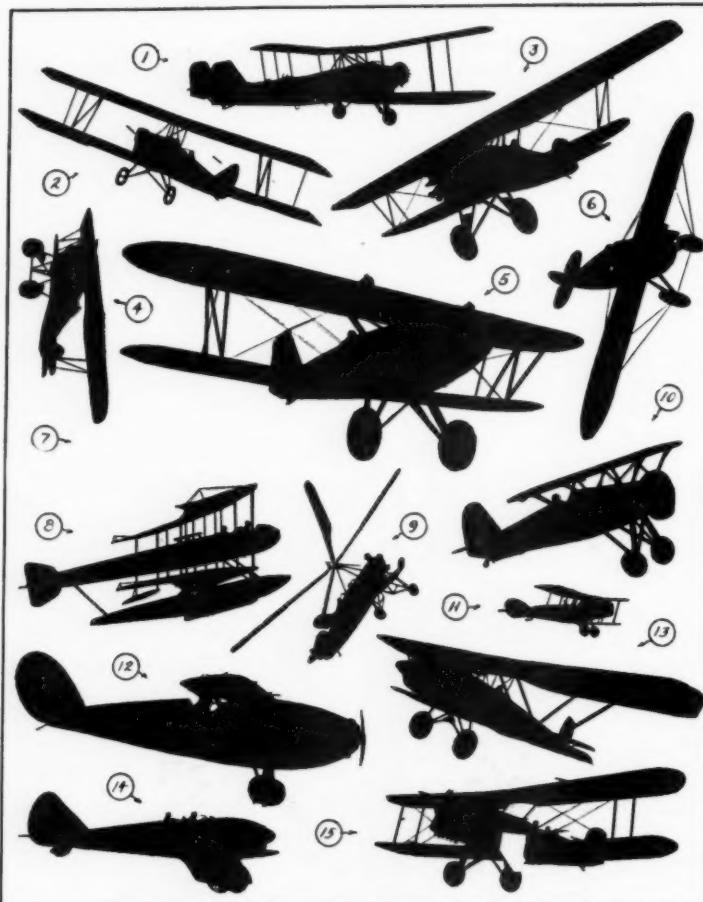
How Well Do You Know Your Airplanes?

What Are the Names of the Airplanes Silhouetted on this Page?

The following awards will be paid by UNIVERSAL MODEL AIRPLANE NEWS to the persons whose letters, in the opinions of the judges, show the greatest evidence of accuracy, neatness and attention to detail. The winners will be judged by Mr. Charles H. Grant, Editor of UNIVERSAL MODEL AIRPLANE NEWS, and Mr. Stockton Ferris, Jr.

Award for First Place, \$5.00; award for Second Place, \$3.00; award for Third Place, \$2.00.

In the event of two or more per-



sons being tied for the first, second or third places, both persons will be paid the award.

All entries to be eligible for these awards, must be received not later than December 1st, 1932. Address all answers to Silhouette Award, care UNIVERSAL MODEL AIRPLANE NEWS, 125 West 45th Street, New York City.

Get busy, sharpen your wits, and see how good you are. This contest will increase your aviation knowledge, which will be a constant source of pleasure to you.

Here Are the Answers to the September Contest

I AM afraid that we owe an apology to our readers for allowing them so little time in which to prepare their answers to the September Silhouette Contest. Due to circumstances which we could not avoid the magazine did not come out until very late. However, some very ambitious and intelligent young men managed to get some very excellent answers into our office before the closing date of the contest. They are to be commended for turning in such excellent copy in so short a time.

There were more one hundred per cent answers to the September contest than for any previous one. The winners, therefore, have been judged on the basis of their neatness and the amount of information they have supplied about each ship, provided all the answers were correct in the first place.

We do not wish to keep you in suspense for too great a time, so here are the correct answers for September.

1. Curtiss Navy Fighter F-9.
2. S.E.5 A (wartime).
3. Solar MS-1.
4. Waco "F" straight wing.
5. Curtiss Carrier Pigeon II.
6. Fokker D.VIII (wartime).

7. Boeing P12-B.
8. Curtiss Hawk P-6.
9. Laird Super Solution.
10. Pitcairn Mailwing PA-7.
11. Vought O2U seaplane.
12. Lockheed Air Express.
13. Fairchild K.R 21 or 21B.
14. Arrow Sport Trainer.

Now, for the names of the winners. All of these boys named every ship correctly as well as giving an unbelievable amount of information concerning them.

The winner of the first award is Kenneth Reeves of 655 West 190th Street, New York City. This entry was extremely neat. Also, he took great care in giving every bit of information that it was possible to give.

The second award goes to Ike L. Kibbe of 1105 San Jacinto Street, Austin, Texas.

The third award goes to Robert C. Morrison, Mercersburg Academy, Mercersburg, Pa.

We wish to give special mention to Ronald J. Small of 601 West 173rd Street, New York City; Wendell Westerlund of 3949 Waveland Avenue, Chicago, Illinois; and Joseph Gigante of 57 East

(Continued on page 42)

Build the Friedrichshafen G II, War-Time Bomber

Complete Instructions and Plans of the
Famous German Bomber That Often
Bombed London

By Robert V. Smith

THE flying model to be built this month is the Friedrichshafen G II, a German war-time ship used for long distance bombing flights. This model is what may be called the little brother of the plane which appeared on the cover of the October 1931 issue of Universal Model Airplane News, the Friedrichshafen G III.

This model is not hard to build, but care should be taken to see that each wing has the same amount of sweepback and each propeller has the same amount of pitch. Because of the fact that the following plans are drawn to exact scale, some of the minor dimensions have been left out, although these can be had by using a ruler.

Fuselage

The sides of the fuselage should be made first. All wood used for this part of the model is $1/16''$ square balsa. The longerons are each $11\frac{9}{16}''$ long and should be pinned to a full-size layout of the side, while the uprights are ambroided between them. The two sides should be joined first at $7''$ then at $1'', 2'', 3'', 4'', 5''$ and $6''$ in that order. The forward gunners pit is formed by thin bamboo strips about $2\frac{1}{2}''$ long. The strips should be ambroided to one side and allowed to dry and then bent around and ambroided to the other side.

Center Sections: Upper Wing

First cut out six ribs $1\frac{3}{4}''$ long and glue them to the wing leading edge which is cut from $1/16''$ balsa. The leading edge is $1/16'' \times 5/32'' \times 6\frac{1}{2}''$. The trailing edge is next. This should be $1/16'' \times 3/32'' \times 6\frac{1}{2}''$ and is slightly tapered so as to follow the rib curve. The support should now be set and glued. It is $1/16''$ square and $6\frac{1}{2}''$ long.

The same directions should be used for the lower section which runs through the fuselage between crosspieces 2 and 3.

Motors

The radiators should each be cut from a block of soft balsa $1/2'' \times 3/4'' \times 1\frac{5}{16}''$. These finished pieces should be hollowed out and with a slot cut through large enough to permit the motor stick and rubber motor to pass. The cylinders, (6 to a motor), are $5/16''$ high and should be mounted on a strip of balsa.

Motor Sticks

Both sticks are made of $1/8'' \times 3/16'' \times 9''$ white pine. A regular propeller bearing is glued to the end of each motor stick. The rear hooks of No. 12 wire are then fastened on.

Propellers

The propellers are each cut from a block of hard balsa $1'' \times 3/8'' \times 4\frac{1}{4}''$. Much care should be taken to see that each propeller has the same amount of pitch as it increases the stability of the model. The propellers should also be very carefully balanced. This is done by sanding down the heavier side until balance is obtained.

Landing Gear

The landing gear should be attached to the center section and should be glued in place after the center section is papered. The four wheels are $1\frac{1}{4}''$ in diameter and are glued directly to the axles. After the socket (c) is glued onto the axle support (d), one wheel should be glued to the axle, slipped through the socket and then the other wheel put on. The axle and axle support should both be made of bamboo because of the stress upon them.

Tail Surfaces: Fin

The fin outline (b) should be first bent either by steam or open flame and then the supports made and glued onto the outline.

Elevators

The elevators should both be made at the same time in one piece and then cut in half when ready to be put on.

Wings: Top Wing

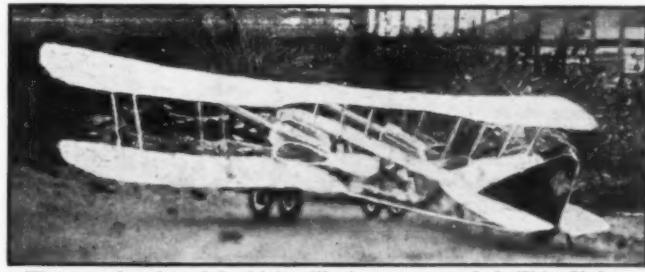
First cut out ten ribs $2\frac{3}{4}''$ long and $3/16''$ high cutting out grooves for the leading edge, the two supports and the trailing edge. There should also be two ribs the same size as the center section ribs. When gluing ribs to the leading edges, do not forget to set them on an angle, especially rib No. 1, as there is both sweepback and dihedral. The wing-tips are bamboo and should be bent before placing them on the wings.

Lower Wing

The lower wing is the same length and height as the upper wing but it is $2\frac{5}{8}''$ wide. This wing also has the same amount of sweepback and dihedral as the upper



The author gives 'er a trial flight



The completed model which will give you a real thrill in flight

wing. The wing struts are placed between ribs No. V and VI and III and X, and are ambroided to the supports.

Covering and Decorating

COVER the model slowly and with care, as a good covering not only increases the looks but also helps the model's flying quality. Although both sides of the wings and fin are covered, only the top surface of the elevators need be covered. All four sides of the fuselage should be finished. After the model is covered, all but the tail surfaces should be steamed and allowed to dry without being touched. This will give the paper sufficient tightness. The tail surfaces should not be steamed because of the danger of warping.

A simple and yet attractive camouflage is shown on Page 15 of the plans. This design should be put on the top and side surfaces only. It consists of thin solutions of black, blue and green paints. It may be put on with an ordinary water color brush. It is best to completely finish the whole plane in one color first.

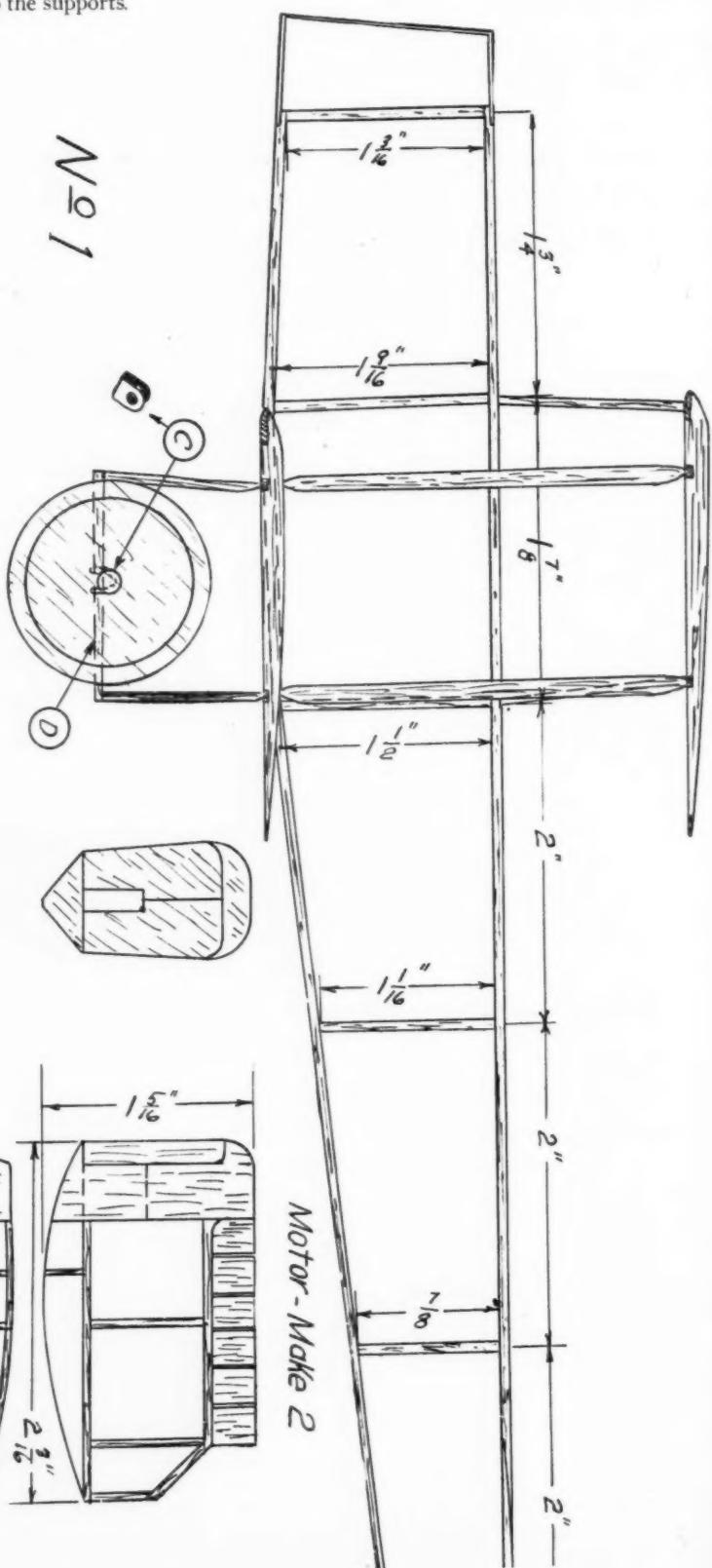
The fin should be black with either the black straight across or iron cross apparent with a white outline.

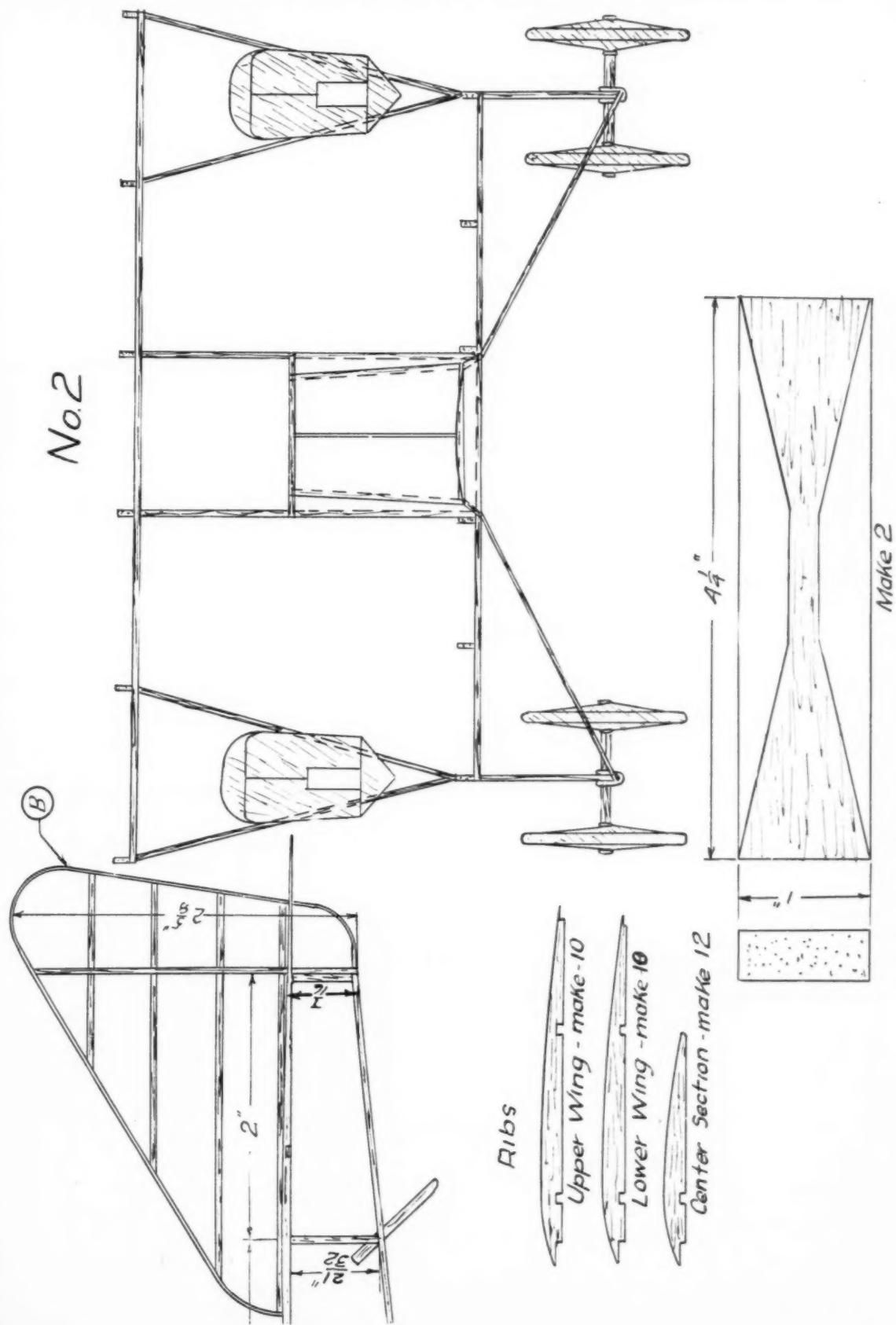
Conclusion

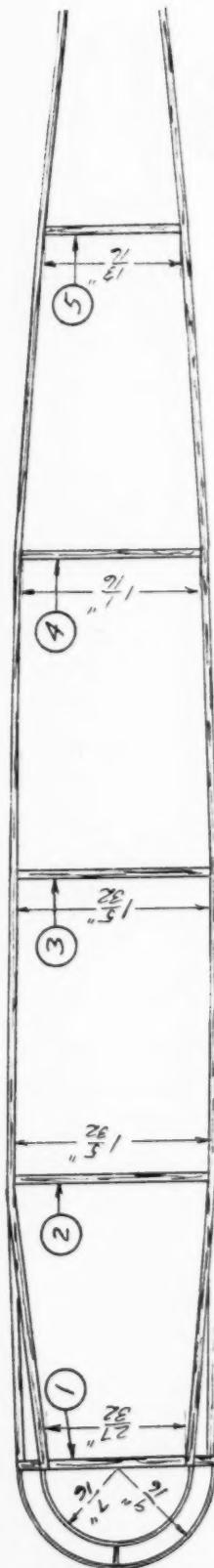
THIS model should be flown with two or more strands of $1/8"$ flat rubber for each motor.

Although it may seem a bit hard to build, it is well worth your while as it is not only attractive in its flying qualities but also in its appearance.

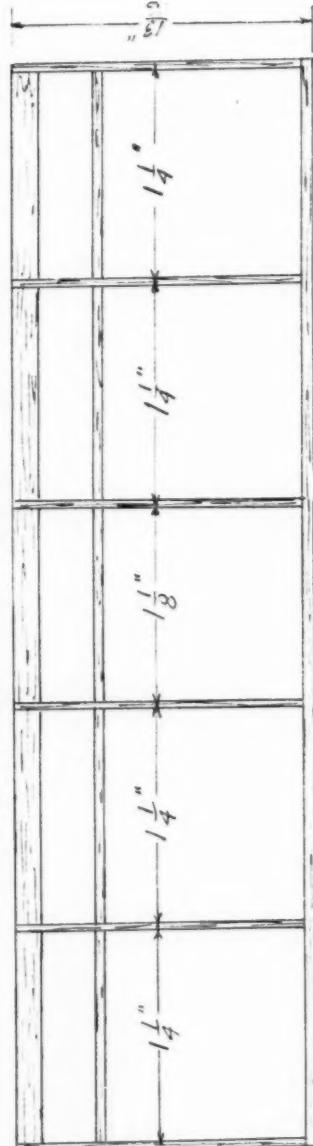
(Editor's Note:—It is always uppermost in our minds to give our readers plans of airplanes that they desire most of all. Therefore, we will greatly appreciate a word or two from you stating the name of the plane that you would like us to publish and whether you prefer that they should be presented as *solid scale models*, *detail scale models* or *flying scale models*. By sending us your opinion in this matter, you can co-operate with us in making UNIVERSAL MODEL AIRPLANE NEWS a medium of greater service to our many friends.)





N^o3

Center Sections



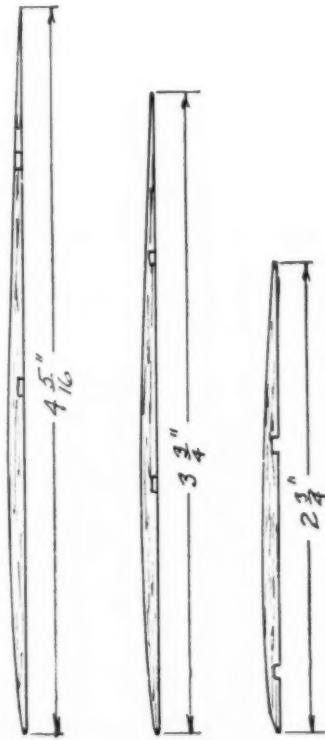
TOP Wing



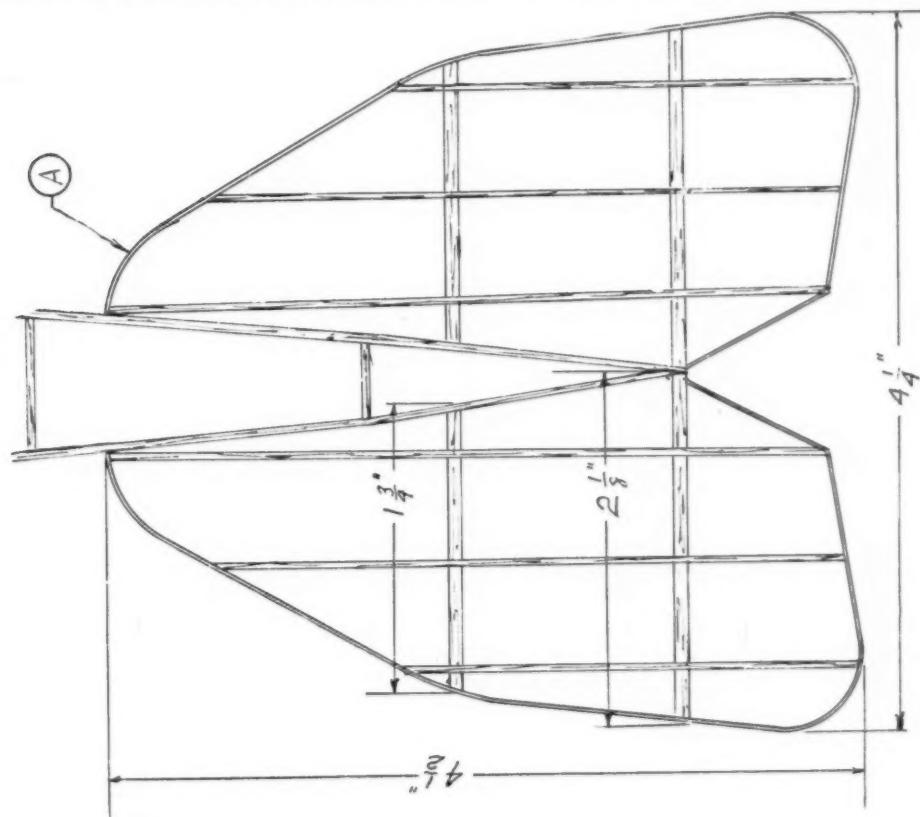
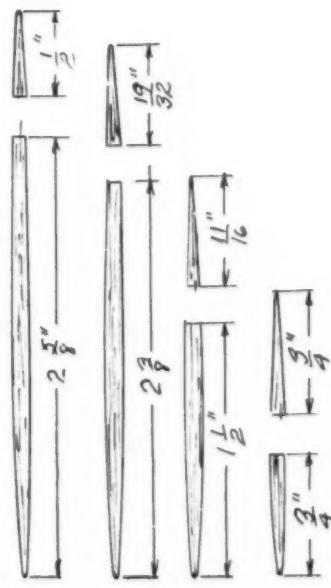
Bottom Wing

N^o 4

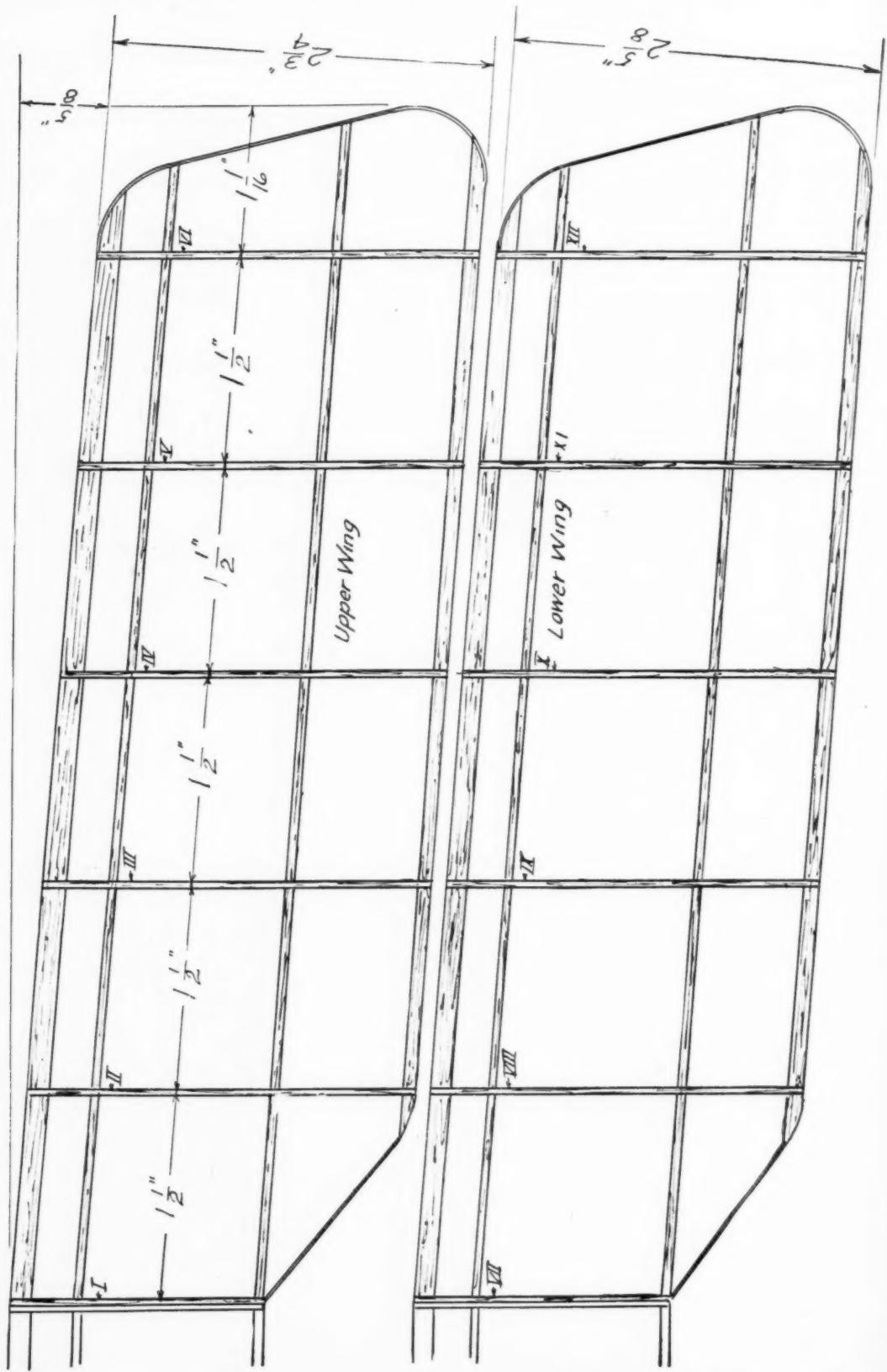
Elevator Ribs - Make 2 of each

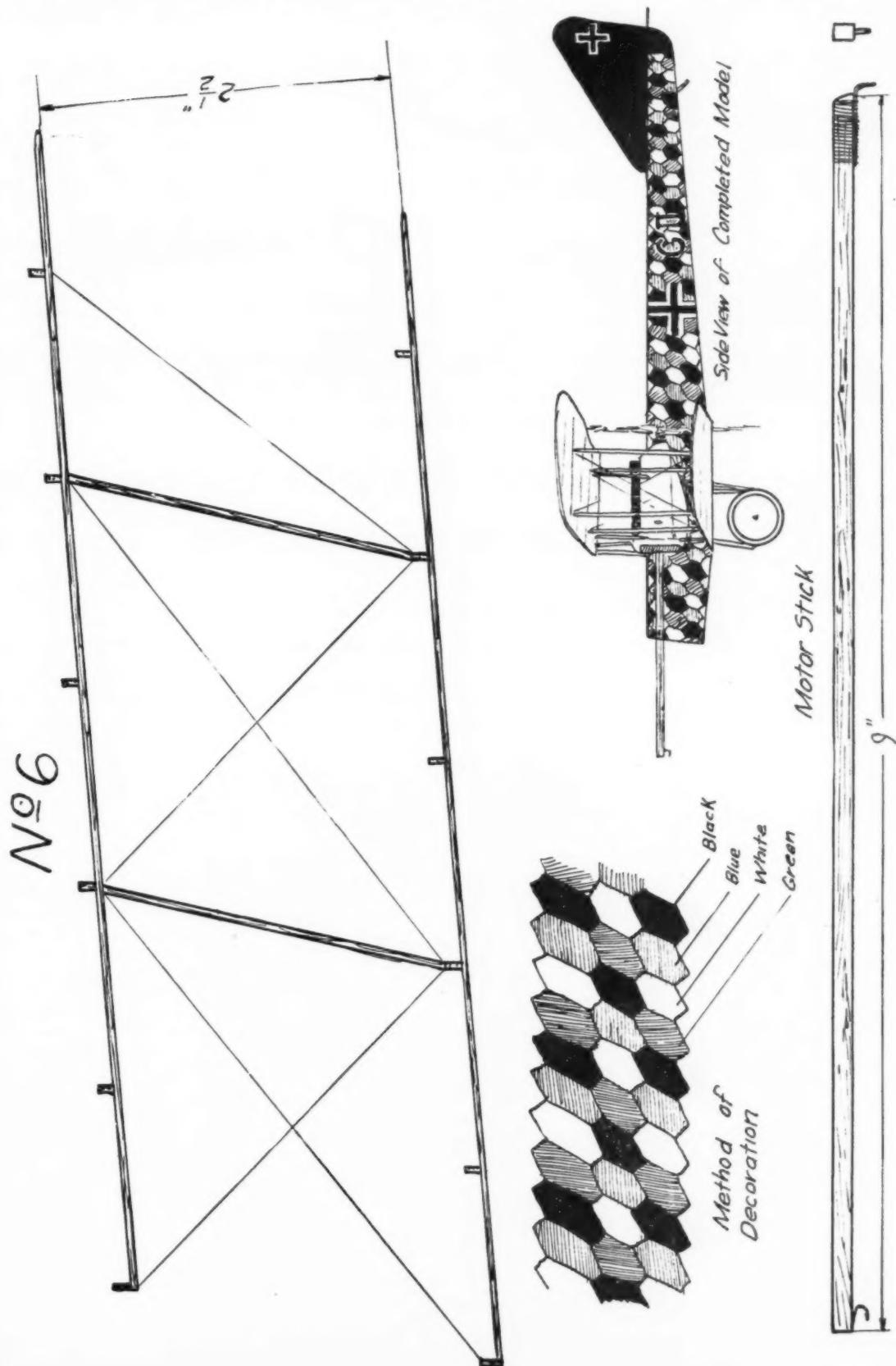


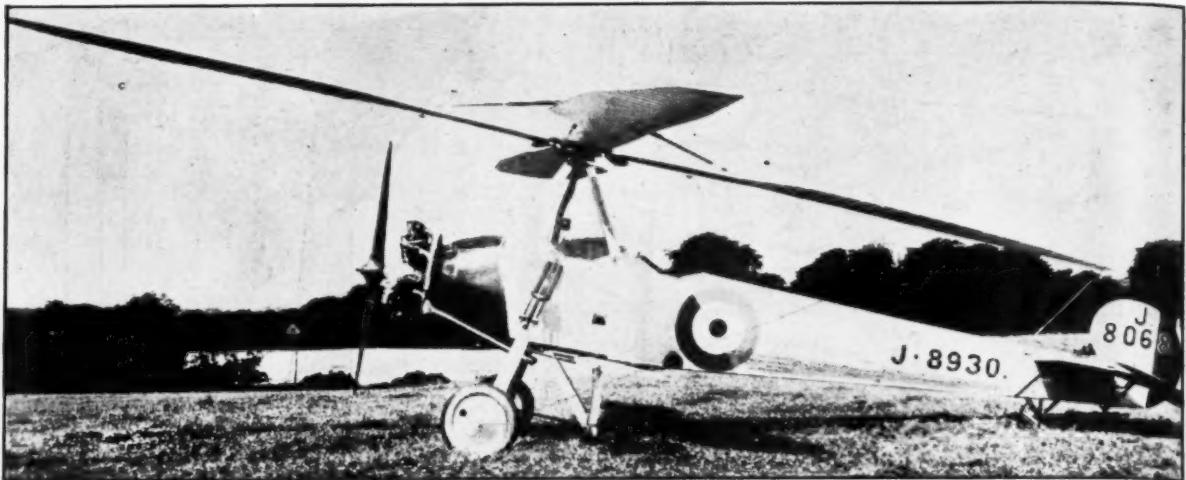
Fin Ribs Make 1 of Each



No. 5







One of the first autogiros built for the British Air Ministry, 1926.

A Pioneer Makes Good

WE left young Juan de la Cierva, you remember, nervously waiting for an equally nervous pilot to test his No. 3 machine. It had a queer 5-bladed rotor and a complicated rig whereby the pilot could change the angle of incidence. This, he hoped, would finally correct the crazy, drunken leaning to one side that had made all his previous designs useless.

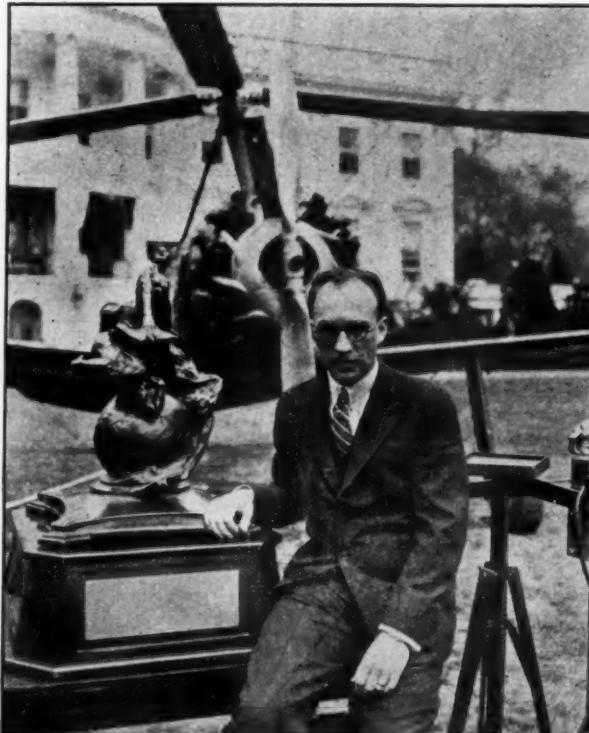
The pilot taxied slowly across the field, his machine wobbling but not quite turning over as previously. He opened her up a bit and the contraption seemed almost ready to hop, as did the inventor. But his practiced eye noted that same habit of wanting to lean on something. Not so much as before—but rigid advancing blades still had too much lift. Changing angle of incidence was no great help, if any. But he felt he was on the right track. He worked twice as hard. Nine times he remodeled that stubborn machine. At every test it showed some signs of intelligence. But it needed something—a new idea.

Luckily, about this time the government showed interest, to the tune of some real money—\$34,000 worth—for wind-tunnel

The Story of the Successful Development of the Autogiro by Cierva and the Application of it to Commercial Use by Harold Pitcairn

By Orville H. Kneen

CHAPTER II



Mr. Harold Pitcairn with the Collier Trophy awarded to him, after landing his autogiro on the White House lawn.

experiments. Scores of tricky little whirligigs, mounted on ball bearings, were put through their paces in tunnel winds that attained 45 miles an hour.

Cierva measured the lift of his rotor when inclined. It proved greater than for fixed wings of equal area. Head resistance was lower than for fixed wings of equal lift, proving his figures okay! So he put his nose to the drawing-board again and drew pictures of a new ship, with five-bladed rotor braced to the axis by steel wires. This time, to keep his ship from leaning over, he built an extra large elevator in two parts, each part to be operated by itself. He then trundled the new machine out for a test—the proof of all theories.

After all his testing and figuring, the blankety-blank thing still tried to lean over! And gyroscopic action was bad. The thing would not be controlled. It had no ambition to get up in the world. But it seemed better than previous ones.

So he rebuilt it—four times—and studied it a thousand times. One night he was at the theatre. His mind wandered from the play, as he thought about one little rubber-driven model which had shown

up well in the wind-tunnel.

Suddenly there flashed into his brain an explanation. Perhaps the flexibility of the blades, made of rattan (or bamboo), as they met the oncoming air, enabled them to adjust themselves automatically. His aircraft—if he ever got it up in the air—would have to ride the whirls and eddies, whereas fixed-wing planes cut through them. His craft must ride them slowly, like a bird, and his rotor should be constantly adjusting itself to the currents, like the wings and tail of a bird.

CALCULATIONS seemed to prove this theory correct. Long weeks of work produced four long, thin blades of laminated hardwood, mounted on a hub supported by a spider, or pylon, rising from the fuselage. It was a queer-looking rig. But it worked better!

When not turning, the rotor blades hung down almost to the ground. But at around 100 revolutions per minute they swung almost straight out, like the outswinging pail of water on the end of a rope.

The pilot swore he could feel their lifting power. The machine would tremble, as if ready to leap into the air. Cervia tried out combinations of two, three, four and five blades. And finally he evolved a scheme of "articulating" the blade fasteners so that the connection of each blade to the hub should be non-rigid. This should enable each blade to freely adjust itself to the load, and to gusts of wind.

Being hinged besides, the fastening was really a universal joint, cables between the blades keeping them from running into each other. But now the blades acted much like a bird's wing, able to wriggle, flop, rise or fall as load and air currents required. As a blade advanced it could be seen to rise at its tip, reducing the angle of incidence and resulting lift. Retreating blades did the opposite.

That, the young inventor believed, should at last balance the machine. Perhaps he uttered the Spanish for Hot Dog! The machine should now be perfect, at least as far as leaning over was concerned.

But it wasn't. The pilot did not seem to have enough control



The autogyro proves of great help in locating and fighting forest fires



Harold Pitcairn explaining the operation of the machine to Orville Wright at Langley Field, Va., May, 1929.



One of the late models, the Pitcairn T.A.-18.

of the contraption. However it no longer had bad gyroscopic habits. The articulated blades stopped that far better than one scheme he had tried, crudely, of having the pilot tilt the entire rotor structure to right or left.

Would he ever be able to lick that tendency to imitate a cow at the end of a rope? He perspired, rebuilt the machine just fifteen times, and found the answer at last. He stuck a pair of flippers out from the fuselage, on either side. Really two small ailerons, on arms. They gripped the air—theoretically.

Would the machine actually fly—or hop—or at least stand straight with the rotor turning? He thought so.

But his heart thumped harder, when it was ready for test, than when his big bomber had been trundled out for its trials, over three years previously. On January 9, 1923, all was ready. The strange bird, perhaps more full of "bugs" than a real one, was taken to the Getafe Airdrome, near Madrid, where there was plenty of room. Now for the proof of the pudding!

PROBABLY no one except the inventor expected the thing to get off the ground. Even he may have had his doubts. So many, many designs had failed, laying down weakly, savagely splintering their long arms on the ground.

The pilot was one of Spain's best—Lieut. Alejandro Gomez Spencer. His strange steed embodied a lot of time and labor and money. He handled it with care. Several men, pulling on a long rope wound around the hub, brought the four-bladed rotor up to speed. The motor, not connected with the rotor, but driving a tractor propeller in the usual way, warmed up cheerfully and loudly.

The pilot waved to the anxious inventor. He taxied slowly to increase the speed of the rotor. The machine taxied easily, did not lean weakly. He "gave her the gun." The whirling vanes took the load. There were cheers as the wheels lifted a few inches. The machine hopped, skipped and jumped across the field. Then, with sudden resolution, the pilot opened the

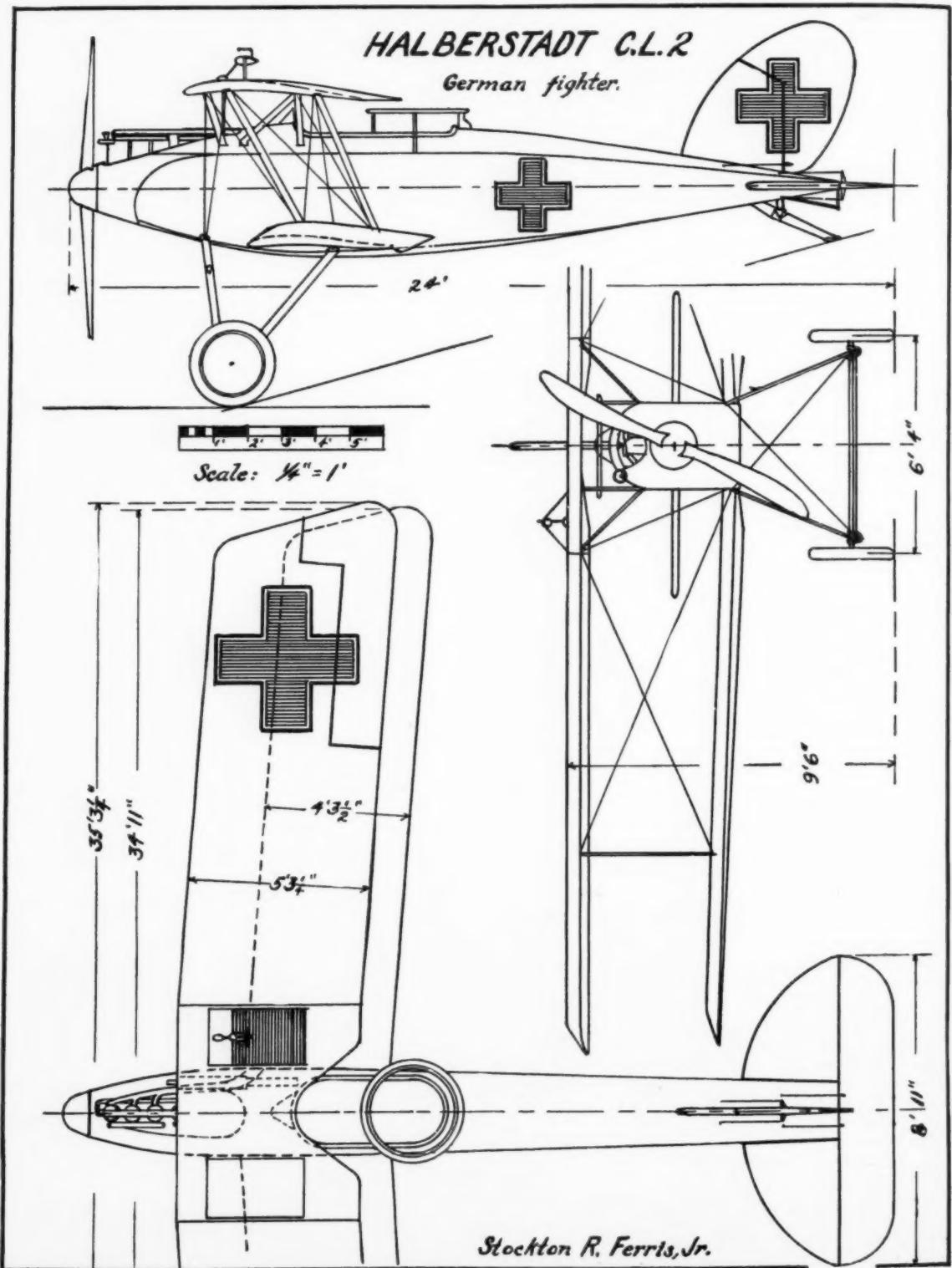
(Cont. on page 37)

THE HALBERSTADT C.L.2 GERMAN FIGHTER

THIS was one of the most highly developed German two-seater fighters in use at the end of the war. It was so classed because of its maneuverability and visibility rather than because of performance. Powered with a Mercedes 180 H.P. engine, it had a

high speed of approximately 105 M.P.H., climb of 500 feet per minute, and landed at 55 M.P.H.

In building a model of this plane, note that the trailing edges of the inner ribs of the lower wing are turned up so as to produce a smooth contour with fuselage.



Airton Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

HELLO, fellow model builders. I always look forward to this little chat with you. Due to my numerous duties it is not possible for me to interview each one of you separately, so we must content ourselves with this short discussion each month.

As usual, we have some very interesting questions. One which I feel is especially worth while to answer, comes from Calvin Stickel of Mount Vernon, South Dakota.

Question. Which is the strongest wood, pine or spruce?

Answer. Spruce is the strongest, although it is a little heavier. Pine weighs approximately 24 to 26 pounds per cubic foot. Spruce weighs 32 pounds per cubic foot. Even so, spruce is much stronger for its weight than pine. The use of pine in airplane construction is, we might say, a hangover from model boat building, and personally, I advise the use of this wood be entirely discontinued. It is easy to work. This explains its use in hulls for model boats. It is inadvisable to use in airplane construction because it snaps quickly and suddenly under sudden stress. In order to make a pine structure as strong as a spruce structure, it would be necessary to make it at least 50% heavier than spruce. A good substitute for pine in making propellers, is basswood. The results when basswood is used are far superior.

HERE are a few questions from Leo Garcia of Albuquerque, New Mexico.

Question. Why will some models, when the wing is set for normal glide, tend to climb too fast and then, if the wing is set for normal flying, the model glides at entirely too steep an angle?

Answer. This is due to the fact that the stabilizer is set at too negative an angle. It should be raised slightly until, through trial, the proper setting has been determined. When the stabilizer is raised it will probably be necessary to increase its area so as to obtain proper stability.

Question. Will too much propeller surface give the same bad result as too much rubber?

Answer. No, it will not. Very few machines have too much propeller surface. The opposite condition usually prevails. Too much rubber usually causes too much torque, while large propeller surface will usually reduce the torque, for the simple reason that the propeller surface on the average model is too small.

Question. How should the areas of rudder, elevator and wing compare on an r.o.g. model?

Answer. The rudder area on an r.o.g. model should be approximately 15/100th of the wing area. The elevator should be about 30% of the wing area. These figures hold true where the distance from the main wing to the center of the tail surfaces is equal to half the wing span. If the distance is shorter than half the wing span, then the surfaces must be increased in direct proportion. They may be decreased in area proportionally, if the distance is greater.

Question. Should a reversed camber elevator have more or less surface than a flat one?

Answer. I assume by the term, reversed camber elevator, that you mean an elevator which is concave upward and convex downward. Under these conditions, less surface will be necessary when using this type than if a flat one were used because when set at zero degrees, the negative curve surface is exerting a pressure downward at the rear of the ship, as a curved surface has a tendency to lift, or when reversed, press downward at its setting of zero. A flat surface obviously set at zero degrees, will not cause any pressure downward or lift upward. Even though the flat surface is set at a negative angle, it will not be as effective as the curved one in creating a tail load.

Question. What is the highest and most efficient angle of attack on a wing surface?

Answer. The angle of (Continued on page 41)



Here is the little plane "Hearts Content" that cheated the Atlantic of another sacrifice in the name of progress. It is a De Havilland Puss Moth, flown by Captain J. A. Molisson, from Ireland to New Brunswick, Canada, in 30 hours and 12 minutes. A record for a westward crossing, from land to land.

AIR-WAYS

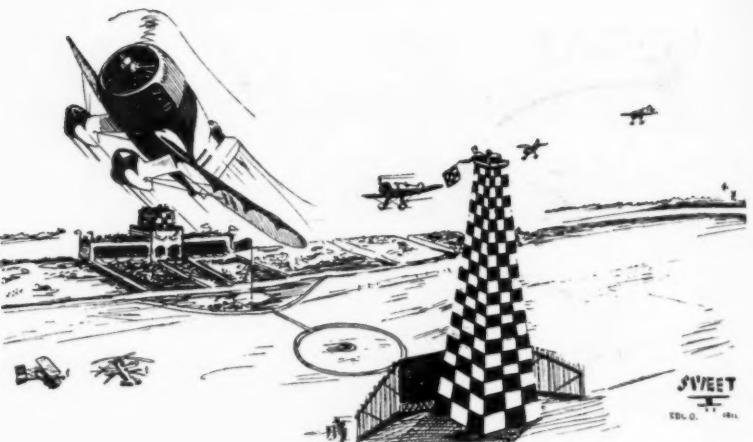
HERE
AND
THERE

Get Busy and "Air Your Ways" of Building and Flying Model Planes. In This Column, Space Will be Devoted to the Activities of Our Readers. Let Others Know What You Are Doing

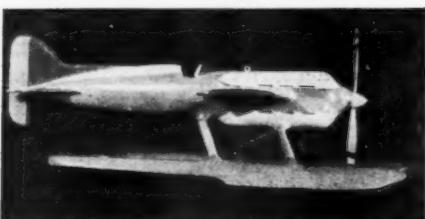
OUR readers have contributed some very interesting features for our Air Ways section this month. There has been a great volume of material sent to us and let me tell you, it's some job to look over all of the interesting things that you fellows are doing and about which you wish us to tell your friends in this column.

After much labor we have selected some material that we feel will be most interesting because of their unusual features.

Our friend, Robert Sweet of Columbus, Ohio, has remembered us again with a sketch showing the Gee-Bee rounding a pylon at the Air Races. This appears at the head of the column to liven the appearance of our pages. Those of you who have read this column each month will remember that



Picture No. 1



Picture No. 2



Picture No. 4



Picture No. 5



Picture No. 6



Picture No. 3

Sweet is a young man of sixteen who has been bedridden for some time. We appreciate his contribution very much indeed.

Manley Mills of Royston, Georgia, has sent us picture No. 2 of Al Williams' "Mercury"

racing seaplane which was built by his friend Jimmy Cherry of Decatur, Georgia. It has a span of 12" and is a very nice piece of work. I believe that this is the first time a picture of this ship has been submitted to the magazine.

Here is a model of a Curtiss-Wright Sedan, picture No. 3, partially finished, in the hands of William M. Wohlleben, which was constructed by Robert Smith, the author of the article on the Sopwith Dolphin. Smith is one of our most active model builders. He lives at Norwich, New York.

PICTURE No. 4 shows Harry H. Van Kirk, Jr., of Condit, Ohio, and Colonel T. J. Herbert of the Ohio National Guard, who is holding the model of a Douglas O-38 of the 112th Observation Squadron. Van Kirk built and presented this model to Colonel Herbert during the Squadron's encampment at Camp Perry last summer. If Colonel Herbert takes advantage of this gift to do a little experimenting in the way of flights, it is possible that he may obtain some interesting data concerning the stability

of the Douglas planes. Model flying would not only be an interesting pastime for military men but possibly would be very instructive, as it has proven to be to the young generation which is so active in this field at the present time. I would like to prophesy here, that these young model build-



Picture No. 7

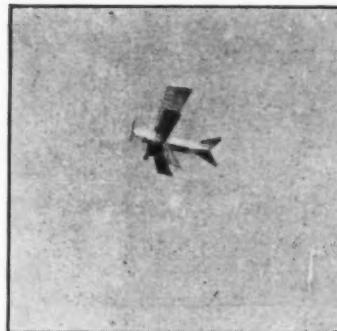
ers of America are going to show the old-timers a trick with a hole in it when they grow up, as they are obtaining information on model flying of which the present-day aeronautical engineers have no conception.

Robert D. Heidenreich of 145 Aurora Street, Hudson, Ohio, has sent us some pictures of interesting solid scale models which he has built. Picture No. 5 shows one of them, a Sopwith Camel. Heidenreich has made a very neat job of this ship. He also has sent us a picture of an Autogiro model which was built from plans supplied by the Autogiro Company. This, we have been unable to publish because of lack of space. However, those who wish information concerning this ship, may write to Heidenreich.

HERE is Picture No. 6 of a Boeing P-12 D, built by Marvin Krieger of 91 West State Street, Sharon, Pa. Every part of it is built up and contains the exact number of ribs and braces found in the large ship. The wings and fuselage are covered with Chinese silk and tail surfaces and ailerons with corrugated aluminum. The detail of the controls and instruments are complete, including miniature maps, a machine gun, safety belt, throttles, stabilizer adjuster, etc. Even the P & W Wasp engine is detailed to the extent of having wires leading to the miniature spark plugs. Krieger says that he would be very glad to give



Picture No. 8



Picture No. 9



Picture No. 13

hints on building or more details on this model, to any of the readers who wish to write.

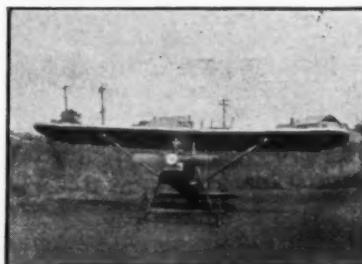
Here is a young man who works fast. A. F. Kitchel Jr., of Greenwich, Conn., sends us picture No. 7 of a Boeing Bomber model built from the plans in *UNIVERSAL MODEL AIRPLANE NEWS*. He has evidently modified the plans of this ship and has built it in miniature as indicated by the smokers pipe which is lying on the ground, immediately in front of the ship. It has taken a little ingenuity to scale down the plans so that he could build this miniature model. It is a nice-looking job.

Here is something that I feel will be of great interest to our readers. It indicates that America is not the only place in which there is great activity in aviation. Joe Axisa of 3, Sda. S. Guiseppe, Sliema, Malta, Europe, writes and tells us about a 14-foot glider kite which he has built and flown. Picture No. 8 shows the machine,

with a boy standing beside it, in order that you may get some idea of its size. Picture No. 9 shows the plane in flight at the end of a rope. When this picture was taken, it was at a height of 400 feet. Joe tells us that his ship stayed up for two hours and in time he expects to have it climb to an altitude of two or three thousand feet. He has promised to send the details about it and its performance, later. Possibly this will give some ideas to the young men in this country and start a new and interesting sport. It might even be possible to build a machine of this type that would carry aloft a man. We wish to thank Joe extremely for this contribution. It is of great interest.

THREE seems to be increasing activity in the building of gasoline powered model planes. Last month we published pictures of the successful model flown at the National Model Airplane competition at Atlantic City, built by Maxwell Bassett. Here we have Picture No. 10 of another machine of this type which was built by Hilary Strzelczyk of 19 Kelly Street, Luzerne, Pa. It has a wing span of 6' 2", and is 4' long. Hilary is very candid in telling us that the machine was a "flop." However, he deserves a lot of credit for his attempt in this new

field of model building. If he keeps at it, as he says he is going to, he will unquestionably build a successful model eventually.



Picture No. 10



Picture No. 11



Picture No. 12

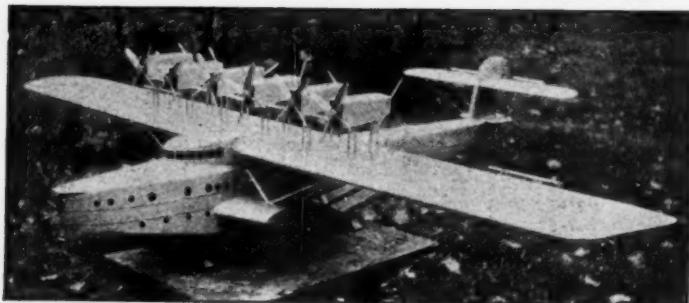
It often takes several years to develop a model of this type which will fly properly. He is to be admired for his frankness and his ingenuity.

Picture No. 11 shows Jack Wilson of Chrome, Pa., standing beside a Heath monoplane which he has just finished. This machine was built in spare time and Jack McIver of 705 Hodgson Street, Oxford, Pa., the young man who took this picture, tells us that it is a beautiful job. It seems that some of the model builders are now growing up and trying their hand at large plane construction. More power to them.

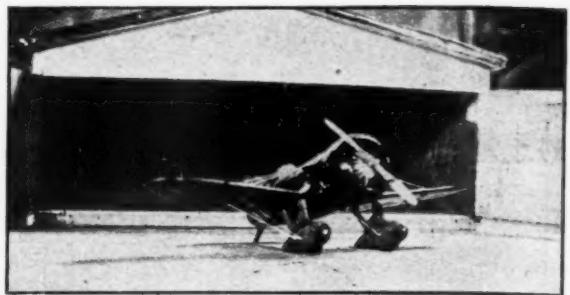
Judging from our correspondence, UNIVERSAL MODEL AIRPLANE NEWS is promoting the aviation spirit in all parts of the world. Ravi L. Kirloskar of Panchgani, Satara, India, sends us Picture No. 12 of himself and a model B.F.W. M23c, which he is holding and which he tells us flew for more than two minutes, landing beautifully like a real ship. This young man is evidently no slouch at model building. In his letter he has written and told us that he has built many ships from plans published in this magazine, including a Lockheed Vega and an S.E.5. We appreciate Ravi's contribution exceedingly and are pleased to know that our magazine is helping young men in foreign lands as well as in this country.

Picture No. 13 shows an S.E.5 and a Fokker in flight, built by Fred Fettig of Elm Street, Newport, Ky. This picture is unusual in that it shows two planes in flight at the same time. Those of you who have tried to get photographs of flying models, realize that this is not an easy thing to do.

In Picture No. 14 we see a trim mail ship flying across one of our readers' back yards. At least this is the impression that it gives us. However, Henry B. Sait of 238 East Seventh Street, Claremont, California, tells us that he has faked this picture. Actually it is a model with a 6" wing



Picture No. 20



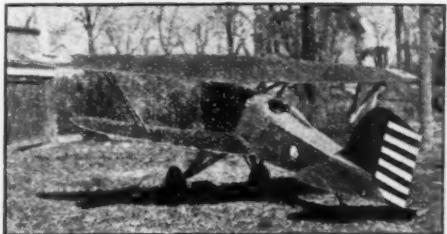
Picture No. 15



Picture No. 18



Picture No. 16



Picture No. 17

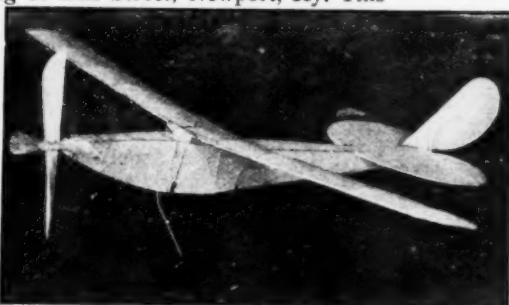
span, held up by a string, a few feet in front of the camera. This goes to show what can be done through the medium of trick photography.

It seems that some of our young men are establishing their own private airports. Picture No. 15 shows the airport of Marvin Riha of 14895 Rutherford Street, Detroit, Mich. The only trouble with this airport is that it is merely a model one, with a Gee-Bee Sportster rolled out on the tarmac. However,

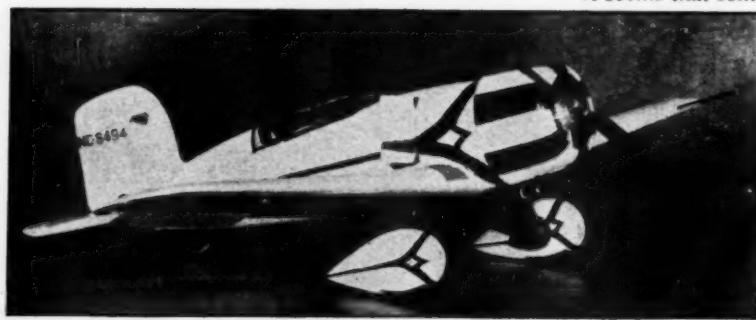
an idea built in form of a model may soon grow to full proportions. It may not be very long before Riha has the real thing in the line of an airport. The Gee-Bee shown in the picture has a home-made steel cowling and a motor composed of 300 pieces. The ship is complete in every detail.

Another young man is going into the model airport business. Roy M. Hardy of Beeville, Texas, sends us Picture No. 16 of his layout of five solid scale models in front of his hangar. They are, Curtiss Hawk, Boeing flying boat, Junkers Bremen and two Fokker D VIIIs.

We have a fine contribution from Richard D.



Picture No. 23



Picture No. 19



Picture No. 21



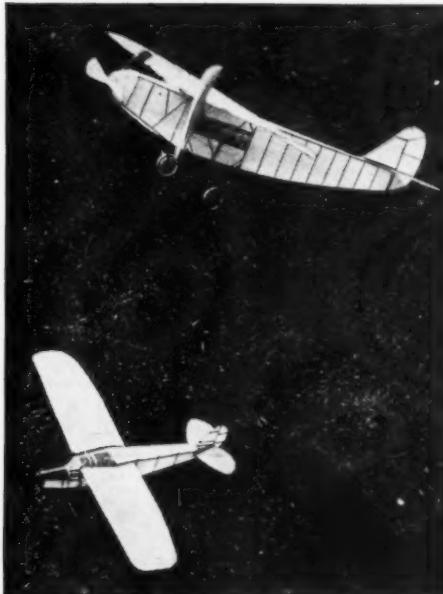
Picture No. 24

Dilley of 524 Pelham Manor Road, Pelham Manor, New York. He has sent us ten pictures of his Curtiss Hawk. However, we are unable to print all of them. Picture No. 17 shows one of the best views of the model. Dilley has spent a great deal of time on this ship and incidentally has expended over \$48.00 in its building and repair. That word, repair, is very impressive. We would say that Dilley has been doing a little flying in restricted areas.

However, what is the use of building a model unless you can fly it. This model was on exhibition at Proctor's in New Rochelle and attracted a great deal of attention. The specifications will surprise you. The span of the upper wing is 5' 3". It weighs less than one and one-half pounds and is powered with a six cylinder radial compressed air engine. Dilley would probably be very glad to give further details to readers who are interested in his ship.



Picture No. 14



Picture No. 22

sire further information about any detail.

Picture No. 20 is a contribution from a veteran model builder. Those readers who

(Continued on page 44)



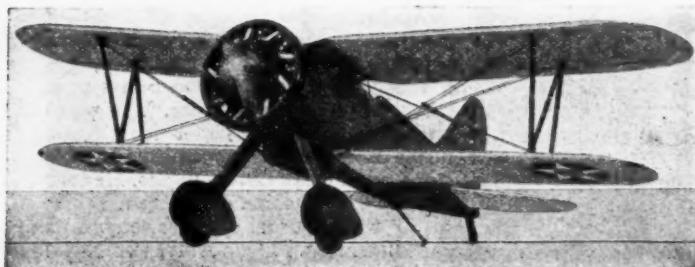
Picture No. 25

IT seems that one of our expert builders in far off Hawaii, S. T. Wong of 1865G Elena Street, Honolulu, has included in his letter, several pictures of ships which he has built. Picture No. 18 shows his fuselage ship in full flight. It has a wing spread of 40" and is driven by a 15" propeller. In the front, the fuselage is rectangular and tapers to a triangular form in the rear. Wong has also built a Polish Fighter from plans in the magazine, from which he has secured some very unusual flights. He tells us that this machine climbs to a height of 50' with unusual speed. The staff of the UNIVERSAL MODEL AIRPLANE NEWS wishes to extend hearty congratulations to S. T. Wong for his unusual work in a location where there is not a great interest in model aviation.

Frank W. Schade, Director of the Junior Achievement Foundation of New Britain, Conn., has contributed Picture No. 19, of a 24" scale model Lockheed Sirius. This was built by Franklin Atwater of 109 Elbridge Road, New Britain, Conn. Those readers who thoroughly understand model building will recognize a fine piece of work in this ship. The unique feature of this ship is that all of the parts have been made by hand. None of them have been purchased. Atwater is also the designer of a very successful flying model Autogiro. He requests that readers write to him if they should de-

These long fall evenings

if you're building
the "Cee-Dee" authentic see



AKRON FIGHTER F9C-2

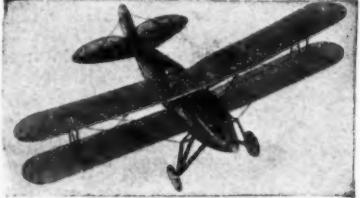
Deck Level Photo Shows It Coming in for a Deck Landing with Hook of Cleveland's New Arresting Gear Dropped in Place.

The U. S. Navy's newest and smallest Curtiss fighter. It is Cleveland's new beauty destined to be the successor of the Laird Super-Solution for beauty and flight and almost everyone knows of the Cee-Dee Laird SF-5 (which sells at \$2.50). It is a very consistent flying model and a real beauty in appearance. Detailed only as Cleveland details its models, including authentic gull-shaped upper wing at the proper dihedral angle, the two-leg landing gear which is very strong when built as Cleveland designs 'em, wind-shield, sights, etc. All balsa comes printed and numbered on flat sheet, including curved parts, dummy motor, propeller, engine, wheels, etc., all-making easier than ever to build Cee-Dee ships. The fact is that the ship itself the new "Beech" is at about the same if some model experience. The fact is that they are about as simple as the Howard to build but having more parts the same as the simple Gee-Bee model, take longer. Being a $\frac{3}{4}$ " scale model, its span is $19\frac{1}{2}$ ", length $15\frac{1}{4}$ ", weight 2.2 oz. Colored-silver wings and tail, everything else blue except details, which may be colored black with ink. Complete Kit SF-22 with everything included, including Cleveland's new enamel dope) only \$1.95 postfree.



Two Striking Views of the LOCKHEED VEGA

Here is a real model of this famous ship—as you thousands of men and boys have requested. And we mean REAL! First time this authentic Cleveland-Designed model was put on display, our engineers were told it was one of the most beautiful scale models ever designed—and that was from not only model builders, but model sellers as well. This model follows no particular Vega, but the color scheme is that of Amelia Earhart's red and gold monoplane in which she recently spanned the Atlantic. For flights this Cee-Dee model is a wonder. Don't delay getting it. Span is $30\frac{1}{2}$ "; length 21"; weight 3.7 ozs.; colored brilliant red with tall surfaces and wheels, everything else gold except black details, for which ink may be used. Kit is complete. In every respect equal with the new enamel dopes and printed balsa same as A-4 Attack Kit. Complete Kit SF-24, postfree \$2.95. (Special Delivery, for U.S. customers only, 25c extra.)



BOEING BOMBER

The 3-mile-a-minute military monarch cleverly modeled in true Cee-Dee fashion. Its three motors feature the new type Cee-Dee power units with exposed rubber $\frac{3}{4}$ " type sleeve. Span 29"; length $19\frac{1}{4}$ "; weight 2 oz. Colored yellow and green. Complete Kit JSF-1005 (everything needed) only \$2.50 postfree.



All "C-D" Models are Guaranteed

to be as represented or your money will be refunded. Defective parts replaced, except broken strip wood, unless all are broken. If Kits are returned for any other reason, a 50c charge is made—west of the Mississippi, 75c. Please read descriptions carefully.



Great Lakes Sport Trainer

Redesigned—much improved over the original Cleveland-Designed model that has become popular in many countries. Easier to build. Flies hundreds of feet. Span 20"; length $15\frac{1}{4}$ "; weight 1.2 oz. Colored orange and black. Complete Kit SF-1 (everything needed) postfree only \$2.50.

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Well-known 1931 National Air Race winner. $\frac{3}{4}$ " scale. Keen flyer. Unusual value. Colored with Cleveland's new white pigmented aircraft dope. Span 15"; length $13\frac{1}{4}$ "; weight 1.2 oz. Complete Kit SF-18 (with everything needed) postfree only \$1.00.

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Every One Complete—Every One the Duplicate Set Master Far in Excess of Its Modest Price—

Authentic $\frac{3}{4}$ in. Scale Flying Model Kits

SF-	1: Sport-Trainer . . .	\$2.50	SF-14: Fokker Triplane . . .	\$2.50	Authentic Scale
SF- 2:	Mystery Ship . . .	2.95	SF-15: Fokker D-7 . . .	2.50	JOF-1005: Hispano
SF- 3:	DeHavilland-4 . . .	3.50	SF-16: DeHavilland D-3 . . .	2.50	% in. Semi-Scale
SF- 4:	Curtiss Hawk . . .	3.50	SF-17: Gee-Bee . . .	1.50	Model
SF- 5:	Doolittle's Laird . . .	2.50	SF-18: Howard Racer . . .	1.00	
SF- 6:	Pooleit P.6 . . .	.95	SF-19: Supermar. 86-B . . .	2.50	FL-301: Autogiro . . .
SF- 7:	C. Hill-Diver . . .	3.50	SF-20: Hawker Fury . . .	2.50	FL-302: Dirigible . . .
SF- 8:	Boeing P.12C . . .	2.95	SF-21: Hawker P.6E . . .	2.50	Large Propellers
SF- 9:	SE-5 . . .	2.50	SF-22: Akron Fighter . . .	1.95	FL-201: C. 100 . . .
SF-10:	Spitfire Camel . . .	2.50	SF-23: Boeing X-9936 . . .	1.95	FL-202: C. 100 . . .
SF-11:	The Expert Quad . . .	2.50	SF-24: Lockheed Vega . . .	2.95	
SF-12:	Nieuport Scout . . .	2.50	SF-25: Curtiss A-3 . . .	2.50	FL-203: C. 100 . . .
SF-13:	Spad 13 . . .	2.50			FL-202: C. 100 . . .

NOTE: Cleveland's new completely printed out and numbered balsa wood Kits SF-22, 23, 24 and 25.

Cleveland-Designed Models are considered by thousands of those who know, as the Standard of Comparison.

VOX POP

"In reading your latest folder I discovered that you included among your terminals one which I wrote more than a year ago. I had only purchased two models then. I now have twelve of your models and find it impossible to compliment you enough. And I don't mean just for appearance and flight ability, but, more to your credit, I believe that you have transformed the construction of model aircraft from an interesting hobby to a most worthwhile pastime."

Irving M. Bailey, 621 Elm St., New Haven, Conn.

"Please send me your Catalog. I have heard of your company in a good way among my friends, who think it is the best they have dealt with."

Illinois.

"I must write to tell you that I never got a better, more complete kit, for twice or three times the amount I paid, than your Howard Racer."

New York.

"My father sent to you for the Cleveland-Designed Laird. Only having built but one plane before, I thought it would be hard, judging from the picture. But I was badly mistaken, it took but a week to build it and I worked only nights on it. It took off beautifully and flew for a distance of 1051 feet and 21 inches in 101 seconds."

Michigan.

"Your models are the most exact I have ever seen."

Vermont.

"I bought a Cleveland-Designed model and it is the best plane I've built in my 17 months of experience."

Ohio.

"I won first and second prizes in a neighborhood contest with your models."

Pennsylvania.

"I purchased one of your Fokker D-VII kits. It completely surpassed all of my expectations. I can truly say you have the best line of models on the market."

Kansas.

All photographs on this page are of the authentic C-D Models themselves. We never use photos of the real ships.

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Besides being sold throughout the U.S. and its possessions, and in all provinces of Canada, Cleveland-Designed Flying Model Kits are purchased by model airplane builders of 32 foreign countries. Christmas Orders for delivery outside U.S. must be placed now.



FOKKER TRIPLANE

Baron Von Richthofen's plane. 1918. Span 17"; length 17"; weight 1.7 oz. Colored red, black, white. Complete Kit SF-14 (everything needed), postfree, only \$2.25.

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a challenge that same part of your makeup that responds to a loaded goal in the last 30 seconds, a bull's-eye on the ordinary! Cleveland-Designed models have an indescribable just having experience to appreciate. You feel achievement, you are deftly masterfully led to a carefully conceived, you start sense the worthwhileness of it—you realize the need of materials and accessories needed. It's real "Cee-Dee" enthusiasts are with you in it.

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Red, Yellow, Green, Blue,
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- F-101: Two Gliders
- F-102: G. L. Trainer
- F-103: Fleetster Mono
- F-104: Boeing P-12
- F-105: Eagle Rock Bullet
- F-106: Curtiss Hawk
- F-107: Mystery Ship
- F-108: Boeing Mall
- F-109: Curtiss Robin
- F-110: Vought Corsair
- F-111: Lockheed Sirius
- F-112: Curtiss Falcon



CURTISS A-8 ATTACK PLANE

Portrayed against Realistic No Man's Land Background. Small photos show various views and abundance of detail embodied in this newest Cee-Dee model.

It's the **reallest** model you've ever seen. Has everything—even instrument boards! All the flying zip, extreme maneuverability and death-dealing accoutrements of America's new "terror of the sky" are packed in this master model job in true Cleveland-Designed thoroughness—detailed to the last feature—machine guns, windows, gas tank, wing flaps, dummy motor incidents, venturi, and pilot tubes! All balsa wood supplied **printed out** and numbered—just crammed full, and we don't mean merely a few so-called "stamped" pieces either, but all intricately-sawn—on 15% stock of 2x1" stock of the various thicknesses necessary in detail. This simplifies and authenticates construction—simply cut out parts and assemble 'em. This Kit, as all Cleveland-Designed Kits, contains everything needed (except paint) to put up black, for which purpose ink or black dope may be used. Also includes the new Cleveland enamel dope which give it that new finish everyone is talking about. Authentic **¾"** scale. Span is 33"; length 24"; weight 4.7 oz.; colored Army yellow and olive drab. Complete Kit SF-25, postfree \$2.95. (Special Delivery mail for U. S. customers only, 25¢ extra.)

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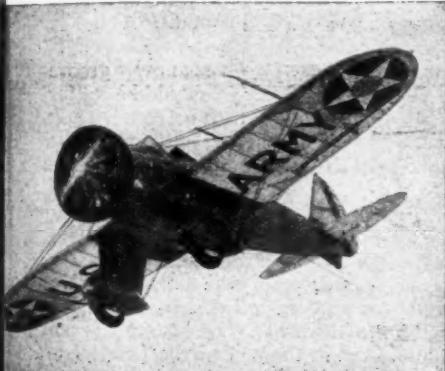
Please co-operate with us by asking your dealer for these Kits before ordering them direct. If he hasn't them, he'll be glad to get them or any other Cleveland models for you. But do not accept a substitute, for "the just as good" item is never just as good as Cleveland's. Remember that the dealer can very easily supply you with any or all of the greatest line of authentic flying models ever produced—the Cleveland-Designed line of 45 different Kits—ranging from 85c to \$3.50. Ask him to get this for you and your friends who want to purchase authentic Cee-Dee models. Right there you have it.

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Complete line of 12 profile fuselage models of simple, sturdy design. 85c each. Curtiss Robin Kit FL-100 shown here, especially recommended.



BOEING XP936

Wonderful Picture of it Climbing on the Turn. Note Particularly the Swiftness of its Action; and the Complete Motor and Ring.

It still has the "X" letter designating it is an experimental Pursuit—a radical departure from the standard U. S. fighting aircraft, being a low-wing. It is capable of well over 225 MPH. The model is detailed as anyone is possible with its numerous little gadgets, the P-W Wasp motor and ring which you easily make, etc., etc. One of the finest and most all Cleveland-Designed models. Due to its fairly large wing area, its abilities are excellent. Being a **¾"** scale model, its span is 20½"; length 25.5". Colored yellow wings and tail surfaces, everything else olive drab. The few details which may be colored black with ink. Price for the complete Kit SF-23, all balsa printed out, new enamel dopes, etc., post-

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Builders of Cleveland and all Northern Ohio and to come and see our new modern retail store, better, brighter—located on the corner of 5th St. and Bridge Ave.—just a few steps from our office location. Easily accessible from Public Square, and parked in the rear of Madison car lines—near Detroit and Harvard-W. 65th car lines, also Frank.

When driving—these roads, Detroit, Brooklyn, Division and Lorain Avenues to W. 57th Street—Cleveland—Cuyahoga to W. 66th Street—Bridge Avenue to W. 57th Street.

The line of finished C-D models displayed here—will be the best in the country. This sheet, one—also many very fine toys and hobby supplies—will be perfect to suit any pocketbook. Store open daily and evenings, from now until 8 A.M. to 6 P.M. After November 1st, open Thursdays, and Saturdays from 8 A.M. (factory outlet at the same address.)



GEE-BEE

A 1931 Gee-Bee that is 18 in. long. **¾"** scale. Span 17½"; length 12"; weight 1.5 oz. Colored yellow and black. Complete Kit SF-17 (includes everything needed) postfree, only \$1.50.

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Every model builder should have it. Packed with news, details and pictures of the 45 Cleveland-Designed Flying models. Enclose 5c to defray mailing expense. Use the coupon below.

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Please rush the following order, for which I am enclosing \$.....

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Name.....Address.....

City.....State.....Age.....

Model Experience.....years.

I am pinning to this coupon a list of models I would like to see you design in the order of those I like best at the head of the list. (Mention 5 or 10 if you wish.) Please give us, also, your dealer's name and address.

1866-N11 West 57th Street, Cleveland, Ohio, U. S. A.

Here is the Curtiss Hawk P-6E

THIS is another plane which shows clearly the trend in modern military construction. Through the use of extensive streamlining and increased power it has given considerable more performance than its predecessors. With its 675 horsepower supercharged Conqueror engine it is said to do 220 miles an hour.

The plans as they are given here are suitable for building a solid scale model, but if the builder wishes to elaborate, the best thing to do is to study photographs of the ship.

The first thing to do is to collect the following materials:

BALSA

10" x 2 1/8"	x 1 1/2"—
fuselage	
16" x 3 1/8"	x 3/8"—
upper wing	
Two 6" x 2 5/8" x 5/16"	—
lower wings	
5 3/8" x 2 1/4"	x 3/16"—
stabilizer-elevator	
2 3/4" x 2 1/2"	x 3/16"—
rudder-fin	
Two 2" x 7/8" x 7/8"	..... pants
1 1/8" x 1" x 7/8"	..... radiator block
2 1/8" x 3/8" x 5/16"	..... head rest

PINE or SPRUCE

Two 5/8" x 1/4" x 2 3/4"	..... landing gear legs
5/32" x 1/16" Stock 2' long	..... all struts
Three 2" x 5/16" x 1/4"	..... propeller

MISCELLANEOUS

About 6" of 3/32" aluminum tubing	exhaust stacks
Small scraps of thin aluminum.....	see article
About 3" of 5/32" aluminum tubing	for gun troughs
Pair of 7/8" air-wheels (as soft as possible)	
One 7/16" wheel about 3/16" wide for tail	
Piece of celluloid about 1 1/2" x 5/8"	for windshield
Small amount of plastic wood for fillets	

PAINT OR LAQUER

Yellow-orange, olive-drab, black, red, white, blue
TOOLS, SANDPAPER, ETC.

A WORD before we start to build. The smaller a model is, the smaller is the measurement on it representing a like distance on the real ship. The ship shown in these plans is drawn to a scale of 1/2"=1', which is quite a fair size for a solid model. However if you make a mistake of only 1/16" on your model it would be an error of an inch and a half on the real plane. So you can see why accuracy is necessary.

Complete Plans and Instructions to Build a Solid Scale Model of Uncle Sam's Greatest Fighter

By Stockton Ferris, Jr.



Notice the refinement of the lines of this latest Hawk

top view. Now here is where careful observance of cross-sections is necessary. Use templates and have them fit exactly. Notice the cowling in front of the cockpit, it has flat faces and gradually becomes curved over the motor.

The radiator is left off at the beginning as it is awkward to shape from a solid block. Make it from a separate block and set in place as shown in the side view. Another difficult point in construction is encountered at the tail. This is where the cross-section shape changes.

Notice at the leading edge of the stabilizer the fuselage has flat sides and top, with the upper corners rounded, while about $\frac{3}{8}$ " ahead of this point, it has a rounded top. A shallow groove should be cut for the exhaust stacks and holes drilled to receive them. Also holes should be made to receive the

machine gun tubes. Now is also a good time to hollow the cockpit. If a small section of the bottom of the fuselage is removed, you can work from this side also. Be sure to glue it back afterwards. The headrest is put in place now and a slot cut in the end of the fuselage to receive the stabilizer. Wherever a line denotes a seam in the cowling, score the wood with a sharp point.

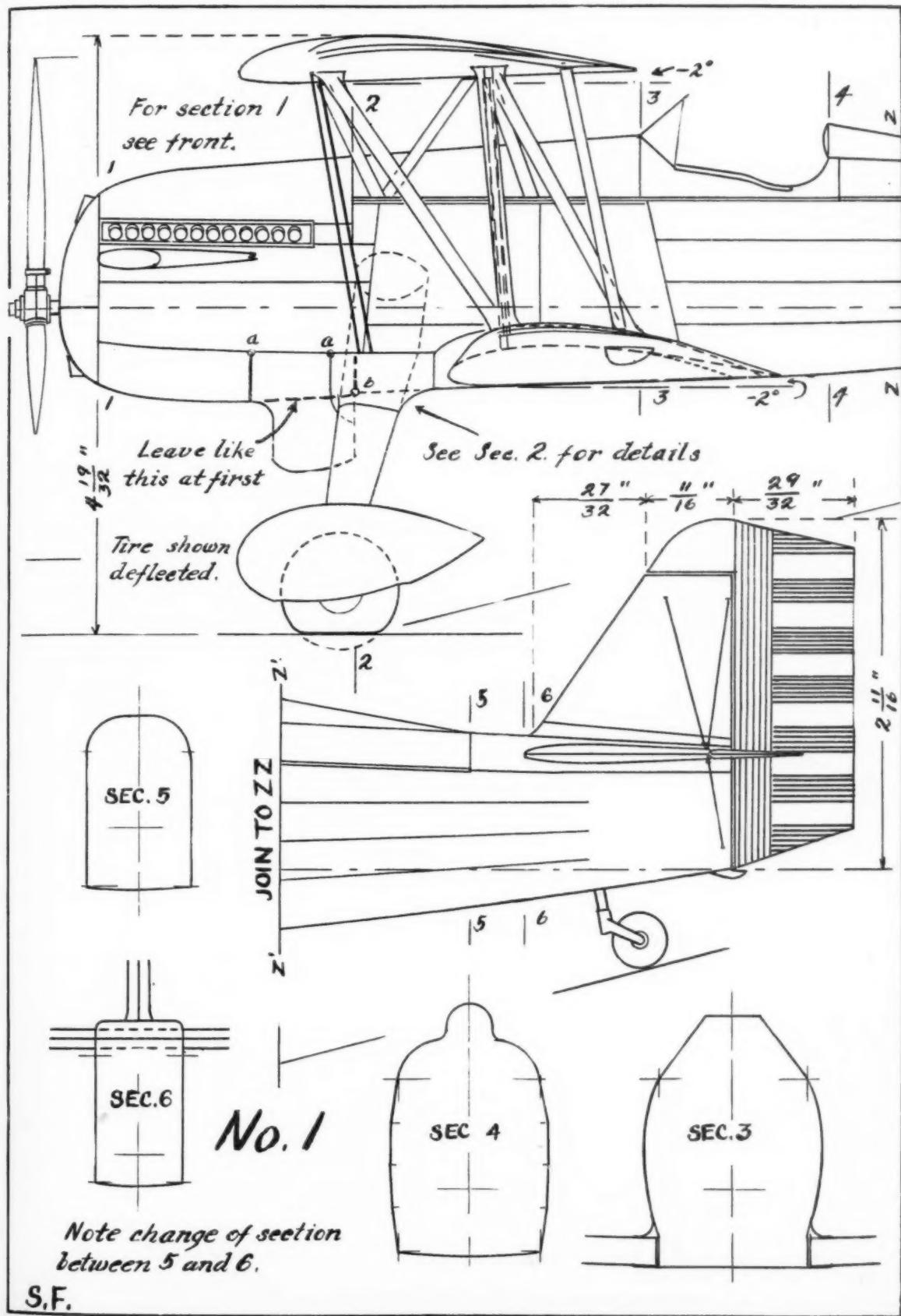
Flow on a good coat of paint and let dry while working on the wings. Don't paint any part on which you intend to put cement or plastic wood later, as it will not hold well.

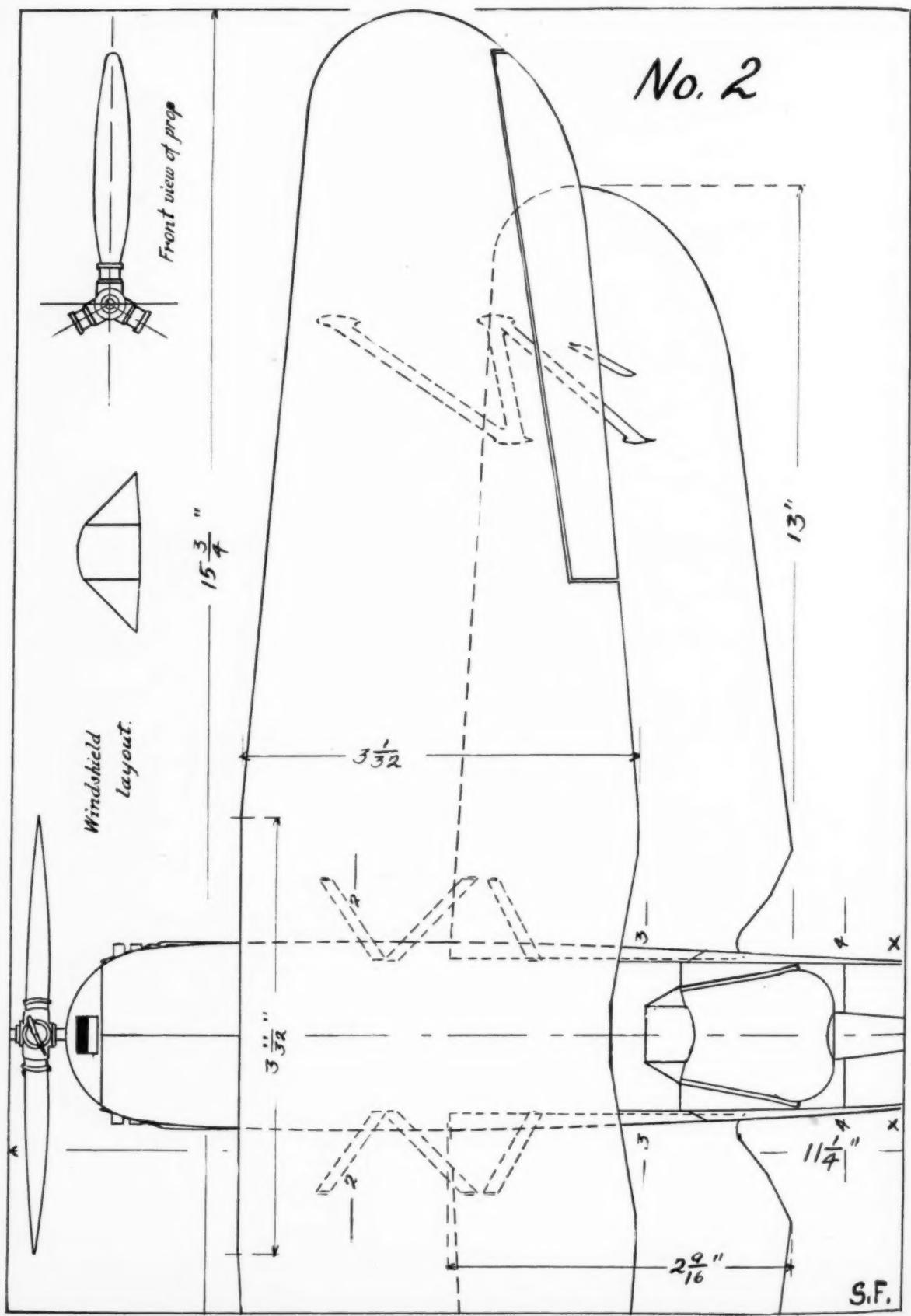
Wings and Empennage

IN making the wings, taper the blocks before trying to put in the wing section. Leave the curved tips until after the section is in. Note the small streamline aileron control horn box near tail surfaces. The control surfaces may or may not be hinged, as desired. Paint all of these parts before assembly. The wings are yellow-orange all over except for the stars (white on blue ground with red center). The stabilizer and elevator are also orange, while the fin and rudder balance are olive-drab. The rudder has red and white stripes with one vertical blue one.

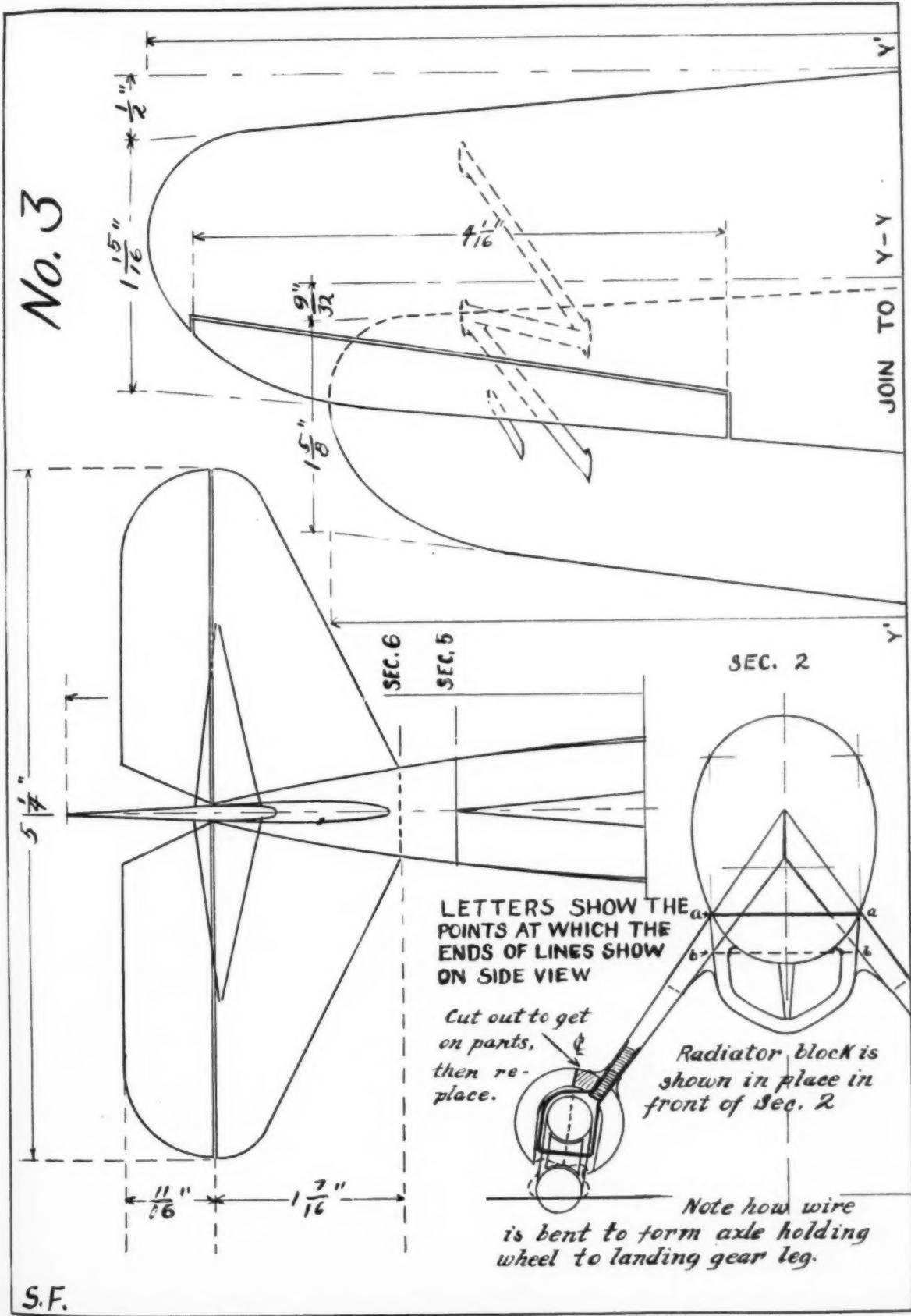
Landing Gear

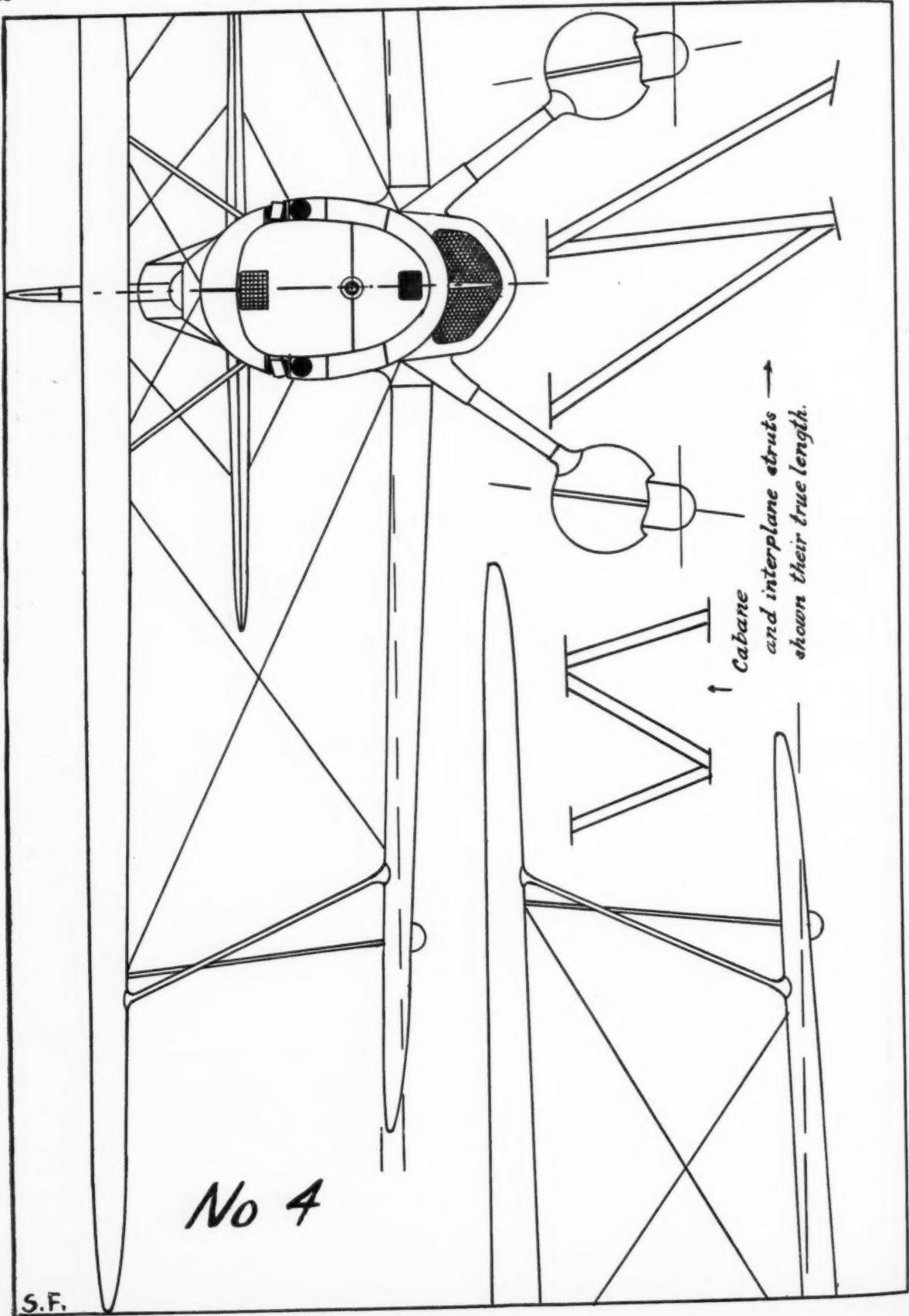
THE handiest way to make the pants is to turn them on a lathe, as they are of circular cross-section. After shaping the outside, split (Continued on page 44)





No. 3





The Aerodynamic Design of the Model Plane

So far in our analysis of Model Airplane Design we have developed the means to lift and propel our model. Many of our young designers are able to produce planes in which these two qualities, lift and propulsion, are worked out to a very efficient degree. However, in most cases their genius stops at this point. The third and most essential factor of flight, a means of securing stability, is often a vague "something" that may exist or may not, as chance dictates. Without this quality a model plane is worthless. Regardless of how efficient the wings and propeller of a plane may be, if it cannot remain in stable flight under varying air conditions, but instead comes to the ground before the motors are unwound, the efficiency of the wing and propeller have no meaning.

In this chapter, data will be given that is the result of twenty years of independent research and which will positively cure your stability troubles if incorporated in the models you build.

First let us consider what "stability" is. It may be defined as follows. Stability is that quality that an airplane possesses when it successfully resists any tendency to displace or turn it from its normal flying attitude, or which causes an airplane to return to its normal flying attitude when once it has been displaced. In plainer words, it is that quality which keeps a model plane "right side up" or which causes it to keep or recover its balance.

There are two general types of stability, "automatic" and "inherent." The first type, automatic stability, is obtained through some mechanism that operates to keep the plane in, or return it to, its normal flight balance, because of the effect of an upsetting tendency. Inherent stability is that type which is obtained because of the permanent shape or "proportion" and distribution of weights of the airplane, without the operation of any mechanical means designed to change the relative position or attitude of the parts of the plane structure, when in flight.

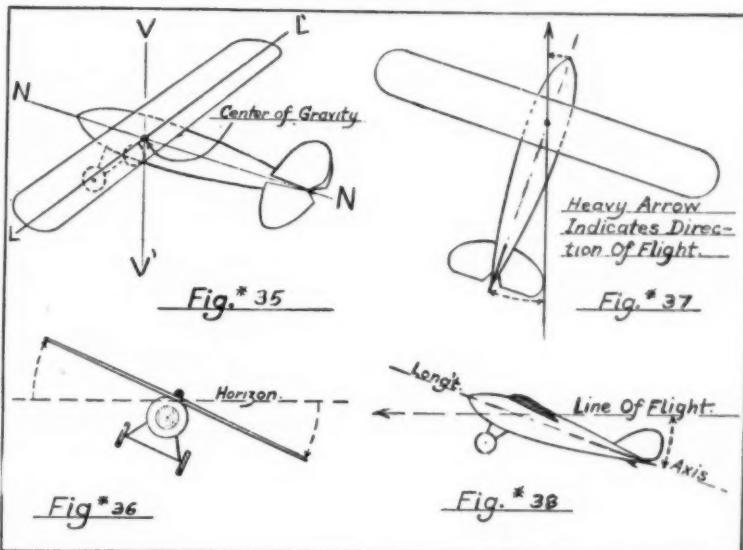
Perhaps some of my readers have heard of the "Auto-

Facts About Stability That Will Prevent Those Puzzling Expensive Crashes and Change Your Obstinate Models Into Real Flyers

By Charles Hampson Grant

ARTICLE No. 10

CHAPTER No. 3



matic Pilot." When installed in a plane, this mechanism operates the "controls" to return the plane to a level flying position upon the slightest displacement from its normal flight attitude. Any such tendency is detected through the reaction of a gyroscope which in turn causes the proper controls to operate. Thus the plane is returned to its normal flying position immediately.

In this case stability is secured through the "control" of a mechanical device, not through the structural shape or proportion of the ship. We say therefore that it is automatically controlled.

This system is applicable to full-sized airplanes but it is not as practical a means of securing stability for models as the inherent method, in which the distribution of weights, the

shape, and the proportions of the model determine the degree of stability. This latter method requires a great deal of knowledge and experience to apply successfully. It is the best one, however, from a practical standpoint, as it does not involve the complication or weight of an auxiliary mechanical device.

SOME model designers, and many designers of full-sized ships, hold the opinion that it is impossible to build a plane that will be perfectly stable under various weather conditions. Do not let such persons discourage you, for such machines have been built, so it can be accomplished again. In fact, in this chapter and in the chapter on control, data are given that will enable you to design such a plane if you apply it correctly, a plane that will fly as if controlled directly by a human hand.

Such a plane designed by the author won the 1931 Mulvihill Trophy at Boston, Mass., against two hundred or more competitors. The wind was blowing so hard that the full-sized planes at the Boston Airport were grounded for the day, yet this model flew in perfect flight balance during all stages of the flight. The majority of the competing models cracked up because of the bad weather. After all, "the proof of the pudding is in the eating of

it" regardless of what the accepted opinions on the subject may be.

Therefore, as inherent stability is simpler and more easily applied than automatic stability, we will only consider the former type in our discussion which will follow.

Three Kinds of Stability

WHEN an automobile moves along a road, it operates in a plane. It has stability to consider in two dimensions. In the case of the airplane, however, we must consider three dimensions. There must be stability about three different axes, as follows: first, about the longitudinal axis which passes from the front to rear of the airplane, through the center of gravity (center of weight) parallel to normal line of flight, N-N Fig. No. (35). Second, the vertical axis which passes through the center of gravity, perpendicular to the longitudinal axis, and parallel to the force of gravity when the airplane is in normal flight position, V-V' Fig. No. (35). Third, the "lateral axis" which passes through the center of gravity of the airplane, perpendicular to the vertical and longitudinal axes, L-L' Fig. No. (35).

Lateral stability is that quality which an airplane may possess that causes it to resist any tendency to roll it sideways about the longitudinal axis, or to recover its normal flight position after such a displacement has taken place. In like manner, directional stability is related to the airplane's displacement about the vertical axis and longitudinal stability about the lateral axis.

Fig. No. (36) shows a plane which has been displaced laterally. It has been tipped over sideways. If it possesses lateral stability it should right itself, returning to its normal horizontal flying position. Fig. No. (37) indicates a directional displacement of an airplane. It will return to the normal flight position if it is directionally stable.

In like manner, the plane in Fig. No. (38) has been longitudinally displaced and will return to the dotted position if it is longitudinally stable.

It must be remembered also that stability is the tendency of the plane to *resist* displacement from the dotted positions to any one of the positions shown by Figs. No. (36), (37) and (38).

IT is interesting to note that the weights of the plane, and their remote distribution, *increase* its tendency to resist disturbing forces and maintain its equilibrium, and is an aid to stability in such a case. While on the other hand, when the plane has been thrown from its normal flight position, the various weights of the parts of the machine resist the stabilizing tendency and make it difficult for it to recover its balance.

The "surfaces" of the airplane have an opposite influence. They resist the displacement from normal flying position, yet also through their influence is it possible for the machine to recover its equilibrium.

In the light of these facts it would be wise to make the inertia (tendency of an object to remain in a fixed position due to its mass or weight) large, IF BY SO DOING, the plane could be made to successfully resist any disturbing force. This is not possible, however, and the inertia of a plane and its various parts makes it very difficult for the plane to regain its balance. In spite of this fact, this is the principle upon which many large-sized airplanes depend for stability. Namely, small stabilizing surfaces relative to the plane's inertia. This makes the ship steady in flight but difficult to recover from spins, stalls, etc. The pilot must have greater control over such a ship. This makes it obvious that the "principle" is not practical for models which must maintain or recover their balance by themselves without the controlling hand of the pilot. For this reason the model designer has a nice little problem "on his hands."

The principle that must be used, therefore, to gain stability in a model is the one which involves the proper size, proportioning and relative position of the "surfaces." The position of the center of gravity and the distribution of weights relative to the surfaces, is an important consideration also. The complexities of the problem are left for discussion later on, in this chapter. It is more to the point now to show exactly

ly WHAT must be done in order to endow our model with these three types of stability, lateral, directional and longitudinal.

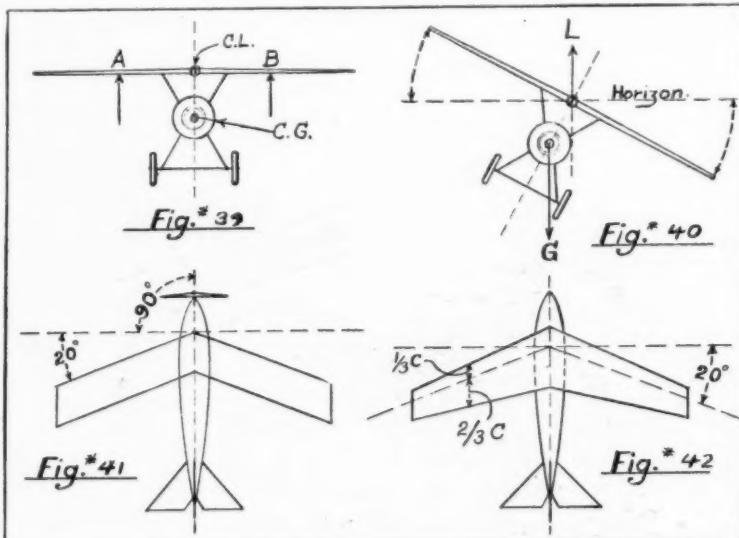
How to Obtain Lateral Stability

THE factors of design that contribute to the lateral stability of the model plane may be listed as follows:

First, a low center of gravity; second, the sweep back; third, the dihedral angle; and fourth, a combination of the first with either one of the last two.

Now let us get a clear conception of the meaning of each one of these and a thorough understanding of their application. When we speak of "a low center of gravity" we mean that the center of weight of the airplane, (a point, when supported at which, the airplane will remain motionless in a state of balance) is considerably below the center of lift. In figure No. (39) the arrows (A) and (B) denote the lift on the two halves of the wing. Point (CL) on a straight line connecting (A) and (B) is the "center of lift." Point (G) indicates the position of the center of gravity or weight which is below the center of lift a distance (CL-CG). We would say in this case that the model had a low center of gravity as point (CG) is considerably below point (CL). If (CG) should be located approximately at the same point as (CL) the condition of a low center of gravity would not exist. Such is often the case with low wing monoplanes.

In the search for the means of securing stability, the use of a low center of gravity was one of the first methods that presented (Continued on page 38)





Builders holding two of the larger models. The one on the right cost more than \$500 and was built by an entire class.

VISUALIZE a modern airport with all of the hangars, administration buildings and other equipment found in a commercial field accredited by the department of commerce, and that is what the students in the Long Beach, California, schools built recently to show the work that they are doing in school in learning aviation.

The boys had built many models of airplanes but there they were with the models on their hands and nothing to do with them. They went to work and constructed an exact scale model of the Long Beach municipal airport on the lawn of a hotel, in the heart of the city, so that everyone could see what they had done for aviation in their city. The outline of the field was laid with white tape one-half inch wide, fastened to the ground with staples. The dimensions were made as large as the lawn allowed but the plot was kept in the exact proportion of the larger field.

Pervailing wind direction was studied from government charts and the landing and take-off lanes were laid out accordingly. Two parallel lanes, one cross lane and a diagonal lane were marked with large white cord and "T" direction cards were placed at the head of each lane.

Six buildings were constructed to correspond to the units at the larger port. The U. S. Army Reserve, the U. S. Naval Reserve, standard commercial type hangars, a new hexagon hangar and an administration building and passenger terminal were made of beaver board on wooden frames.

Each of these buildings was placed on the field as they ap-

A Miniature Airport for Model Planes

Now You Can Follow the Example of These Los Angeles Model Builders. Build One of Your Own

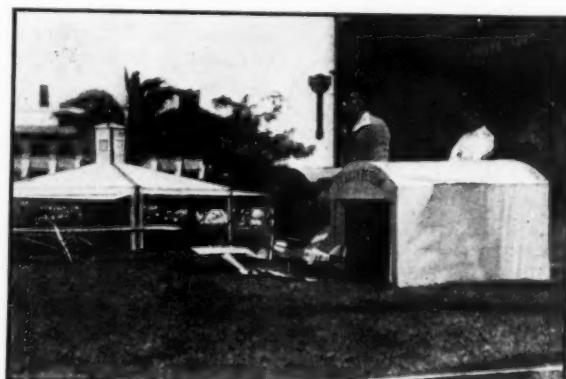
By Henry Hodges

peared on the real airport. In front of the passenger terminal a tunnel made of wire and drab colored canvas awaits the loading of passenger planes. On the opposite side of this building the driveways and parking spaces are laid out.

Model planes constructed by students were placed in the hangars and on the runways to depict a busy day at the municipal airport. About twenty-five models of standard commercial, army and navy types were displayed. The display was left up for one week and each day a different boy was enlisted to explain the display to passing citizens and sightseers.

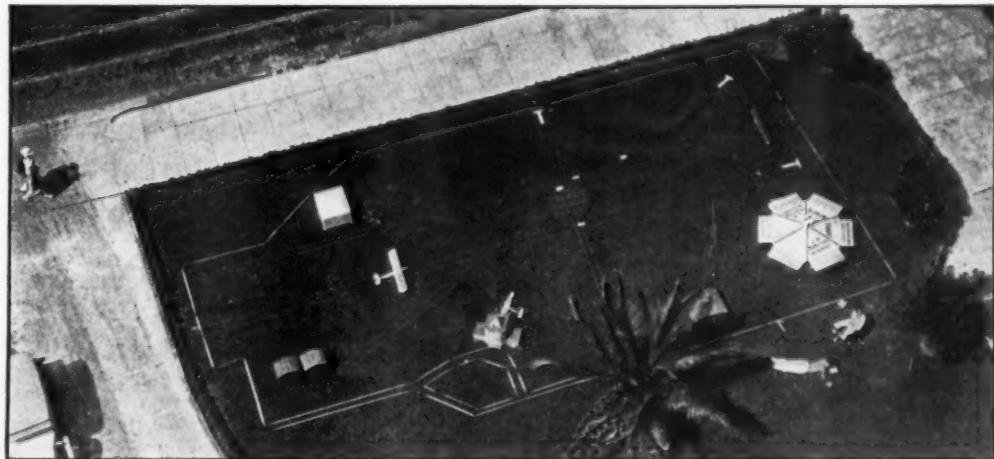
Construction

If you should desire to construct an airport such as shown in this article, it is suggested that you use the in picture No. 3, as a plan. As this picture was taken from a point almost directly above the airport, the dimensions that you will get when scaling them off from the picture will be fairly accurate. This should prove to be a very interesting problem for the young airport engineer. (Continued on page 45)



Army, Navy and hexagon commercial hangars shown with some of the planes.

view of the airport shown As this picture was taken from a point almost directly above the airport, the dimensions that you will get when scaling them off from the picture will be fairly accurate. This should prove to be a very interesting problem for the young airport engineer. (Continued on page 45)



Aerial view of miniature airport taken from 10th floor of a building

One of the Earliest Aviators

THESE pictures show a model "A" aircraft put in circulation by Mother Nature ages and ages before puny man took it into his head to gain altitude and subject his frail anatomy to nosedives, tailspins and divers other haphazard stunts. The craft in question is of the "heavier than air" type and may quite properly be called a monoplane. This particular model has undergone few, if any, changes in construction since its appearance in the dim and hoary past. It was very close to perfection from the very beginning.

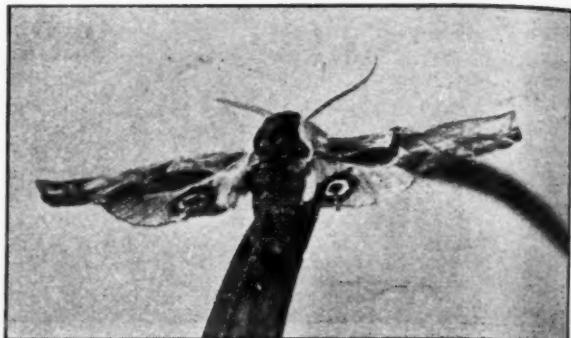
Birds have served the courageous group of human flying pioneers as models, but none, so far as is known, has ever considered it worth while to question the modest insect about his uncanny perfection in the art and technique of aviation. It seems strange that that should be so, for the lowly "bug" has not only unquestioned superiority in the art, but seats of priority as well.

Take the handsome fellow pictured here. He belongs to the noble and ancient family of Hawk moths. He can fly rings around any bird excepting none. And his ancestors?? Why brother, they were on the wing doing their stuff in the air when our old Mother Earth was just a sprightly youngster and birds were still fish, and poor fish at that, maybe!!

LOOK at this trim fellow! From the standpoint of engineering alone, he has any bird beaten forty ways. His build inspires ability, power, swiftness, gracefulness and you may rest assured he has all of that, and then some. Chances are he knows little or nothing else, but he DOES know his aviation, and as a navigator he has no equal anywhere. Storm, rain or fog mean nothing to him. He finds his goal no matter what the flying conditions. He always travels at a tremendous rate of speed and getting out of tight places is his specialty. Straight up or straight down backward, forward, left or right, it's all the same to him.

Here he comes, shooting toward a flower with the speed of lightning. There is no apparent slowing down, but within a small fraction of an inch of his goal, he comes to a dead stop in mid-air. Hovering gracefully before the nectar-laden blossom, he takes a sip and off he is again, so swift that the eye cannot follow.

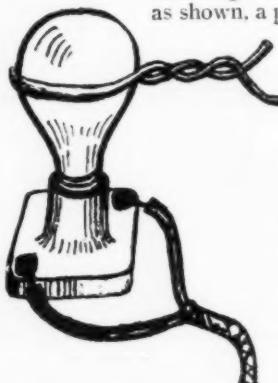
Why not investigate the "lowly bug"? Learn some of his tricks and apply them.



A perfect airplane, the Hawk Moth

How You Can Bend Your Balsa Strips

WHEN making model airplanes it is sometimes necessary to make round bends in balsa or bamboo strips. These bends are hard to get true and smooth by steaming, but if they are made around a hot electric lamp, as shown, a perfect shape may be attained.



Electric lamp serves well to bend balsa strips

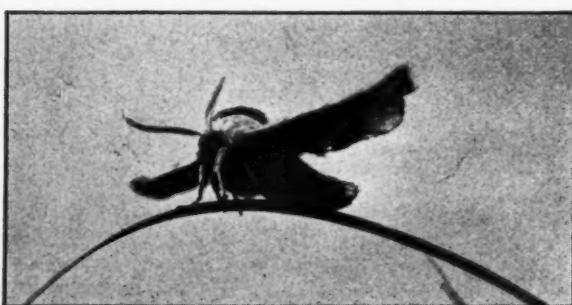
"Now You See It—Now You Don't"

DURING the World War, the art of camouflage had developed to a high degree. European engineers have been experimenting ever since and the accomplishments of one of them were recently demonstrated before an astounding group of foreign newspaper correspondents at Lake Garda. Here, a hydroplane, painted with the new type of camouflage, invented by an engineer in the Fiat factory, was seen to rush across the waters, to rise into the air and then to disappear completely. Everybody gasped in wonder when the plane's motor was heard approaching, then receding and finally zooming down

to the water. Not until its pontoon struck the surface of Lake Garda was the plane again visible to the murmuring audience who immediately rushed to examine it. Before the foremost of the crowd arrived the mystery plane was whisked away by Italian troops who are closely guarding the latest miracle of science.

Latest Device Gives Great Speed

HARRY CAMPBELL, night mail pilot for Trans-continental & Western Air, has discovered the solution for all the problems of the air lines. An interested observer watched Campbell land his Northrop mail plane last week. "How fast do those planes fly?", asked the observer. "They have a cruising speed of 150 miles an hour and a top speed of 175 miles an hour. We carry the mail from Los Angeles to New York in 22 hours and 42 minutes," Campbell replied. "Sometimes when we have a tail wind we get the speed up to around 200 miles an hour." "Well," said the observer seriously, "why don't you equip all your planes with tail winds?"



Remarkable plane ready for take-off



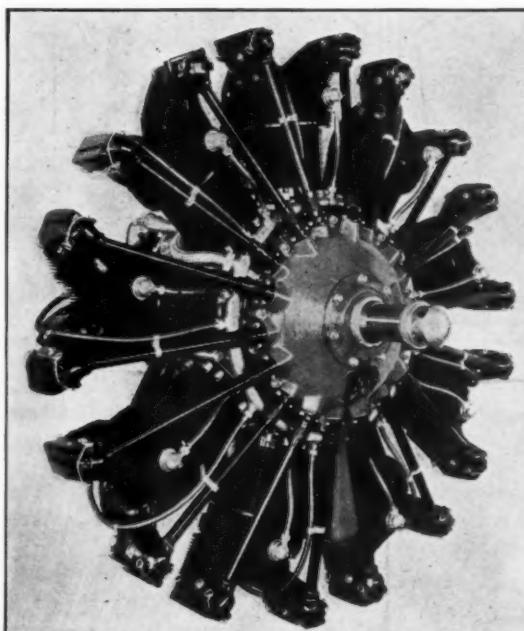
New Curtiss Hawk that travels 200 miles per hour

Latest Hawk Travels 200 M.P.H.

HERE is the latest Curtiss Hawk. It has a top speed of over 200 miles per hour as well as an exceptional all-round performance, as indicated by tests recently conducted at Buffalo, New York, where the planes were constructed by the Curtiss Aeroplane and Motor Company. This unusual performance is primarily due to the latest 700 h.p. Wright Cyclone engine with which it is powered, to the new type Curtiss single strut landing gear, and to the clean lines of the ship.

This new landing gear is a distinct improvement over the old single strut gear used in the past. As you can see from the picture, the outer part of the fairing covering the wheel is cut away so that the wheel can be removed without first detaching the fairing. Thus, all the advantages of wheel fairings may be obtained without the disadvantage experienced heretofore.

Twenty-four of these ships have been shipped recently to the Turkish government by the Curtiss-Wright Export Corporation. Mr. W. F. Goulding, Vice-President of this corporation, states that this shipment is only a part of a large aviation program being worked out by his company for the Turkish government, which includes the development of factory operations at the Turkish airplane manufacturing plant at Kayserie. Here the Curtiss Hawk Pursuit and Curtiss Fledgling Training planes will be manufactured. Technical personnel has also been furnished by the Curtiss-Wright Export Corporation to assist the Turkish government in establishing service



The latest Wright Cyclone (F) engine. It develops 700 horsepower

stations and giving instruction on the proper care and service of the planes and engines.

This new Hawk is extremely light for the power developed by the engine. Usually 100 horsepower will develop 500 pounds or more static thrust. Thus, 700 horsepower should develop in the neighborhood of 3500 pounds static thrust. In view of this estimate, these ships should have a climb that is nearly vertical. These facts may give rise to considerable thought upon their performance possibilities in actual combat.

New Powerful Cyclone

THE accompanying photograph shows a picture of the new Wright Cyclone F engine with which this ship is equipped. This nine-cylinder engine, rated at 670 h.p. by its manufacturer, was given a rating of 700 h.p., at 1900 revolutions per minute, by the Department of Commerce.

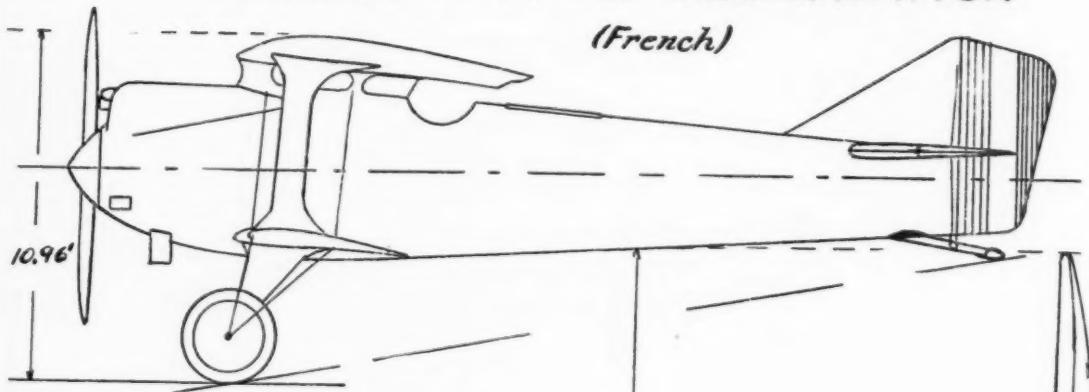
It is also the lightest production air-cooled aviation engine in the world in weight-per-horsepower. It weighs 1.22 lbs. per horsepower. This extremely low weight is especially interesting when compared to automobile engines whose weight ranges from 10-15 lbs. per horsepower.

New features incorporated include a very short rigid crankshaft designed to eliminate vibration at operating crankshaft speeds, and an entirely new design of cylinder head in which is included a spark plug cooler cast as an integral part of the head which affords much more efficient cooling, thereby making it possible to obtain higher power outputs. This new Cyclone is also equipped with a large 11-inch supercharger blower compared to a 7-inch blower used in previous models. It will afford efficient supercharging without running the blower at high speeds ranging from 20,000 to 28,000 revolutions per minute as has been the case with supercharged engines using small blowers.

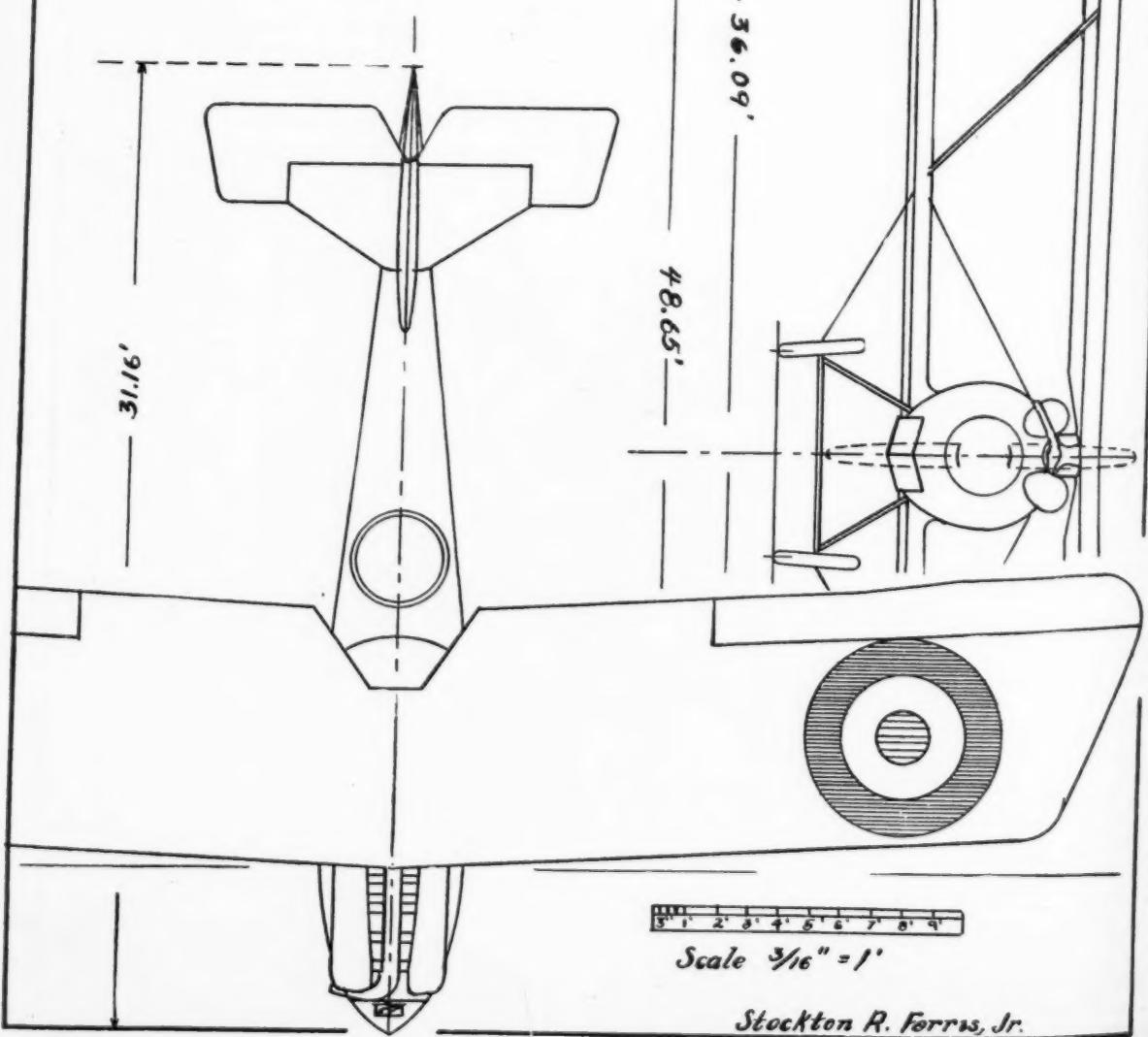
The engine weighs only 10 lbs. more than its predecessor, the Cyclone E, which had a Department of Commerce rating of 575 h.p. Its diameter is 53 3/4 inches.

BREGUET 19-A2 OBSERVATION

(French)

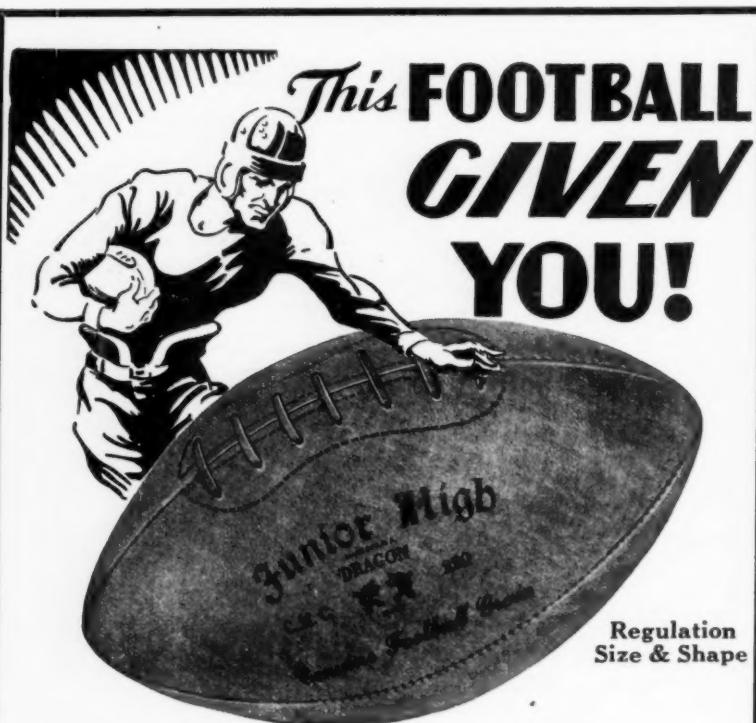


Engines - Hispano-Suiza, Renault,
Lorraine-Dietrich, Farman (450-600HP)
High-speed - 135 M.P.H.



Scale $\frac{3}{16}'' = 1'$

Stockton R. Ferris, Jr.



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Aerodynamic Design

(Continued from page 32)

itself. It is evident that if the airplane should be tipped over sideways as in Fig. No. (40) the weight of the plane (G) would have a tendency to swing as would a pendulum and bring the machine back to its normal horizontal flight attitude. The farther G is below the center of lift, the greater will be the righting effect.

However the righting effect is not sufficient to cause satisfactory lateral stability in all cases, and therefore this method is usually used in conjunction with other means. A model embodying this method alone will insure stable flights when air conditions are right but cannot be depended upon to act as a proper means of stability in all kinds of weather.

To secure the best results, design your model so the Center of Weight is as low as possible. If it is carefully designed, the results may be perfectly satisfactory. The center of weight should be below the center of lift, at least a distance amounting to five per cent of the wing span. If the span of your model is 25 inches, the distance (CG-CL) Fig. No. (39) should not be less than (1 1/4) inches.

Sweep Back

A FORM of wing design, known as the "Sweep Back" is also effective when it is used as a means of obtaining lateral stability. The name originates from the fact that in the practical application of this method the wings are constructed in the form of a wide "V" horizontally disposed. The apex of the "V" is formed by the intersection of the leading edges of the two halves of the wing, which slant backward from the nose of the ship in a horizontal plane. The two wings, right and left, form the legs of the "V." Fig. No. (41) shows the plan view of a wing with a sweep back.

The effect of this type of design is to "right" the airplane when it has been tipped over sideways from a horizontal position. However, a swept back wing is not as efficient as a straight one, and ALSO CAUSES THE PLANE TO HAVE A TENDENCY TO "SPIN" upon slight provocation.

If the amount of sweep back is small, this effect may not be produced but the stabilizing effect will be often insufficient. It is possible to have such a model fly properly under good weather conditions, but it is not always satisfactory as far as consistently good flights in all kinds of weather are concerned. However, it serves as an interesting experiment for the model designer.

Amount of Sweep Back

THE amount of sweep back varies from 10 degrees to 30 degrees. The less that can be used and yet retain a sufficient amount of lateral stability, the better. Twenty degrees is usually sufficient for the average model with a high center of gravity; that is usually in cases in which the line of thrust is close up under or just over the wing center section. This means that each wing slants backward at an angle of twenty degrees to the lateral axis of the machine, or to a line drawn through the apex of the "V" formed by the wings, and

(Continued on page 45)

Flying the Front

(Continued from page 7)

across the lines. Wild, stolen forays into the war game they were soon to know so well!

EVENTUALLY, our Flight Commanders offered these French and British units the use of our pilots. They were accepted cordially and initiated into the grim art of fighting in the clouds. Americans were soon flying Spads and Nieuports with the French, and Camels or S.E.-5s with the British.

Ingalls, along with several other members of the Northern Bombing Groups, was loaned to the British Squadron No. 213. Except for a short time when he was ordered back to Dunkirk to work with the Navy group there, he continued until the end of the war with this British outfit. At first, he flew Camel seaplanes but later the squadron was equipped with landplanes which gave them better odds with the Germans in dog-fighting.

The young American's first redoubtable exploit came when he was separated from his patrol during a flight. At first, his sensation at finding himself a lone airman back of the enemy lines, was not a happy one. But when the initial strangeness had worn off, he relished the idea of being able to do some stalking on his own. Presently, he discovered a German two-seater busily engaged in directing artillery fire. Taking a quick survey to be sure the planes did not have an escort of Fokkers in a position to dive on him from above, Ingalls pointed his craft down towards the German and with full throttle, descended upon him.

A spatter of bullets from Ingalls' gun was the first warning the enemy pilot received. He was quick and experienced, and in spite of Ingalls' daring attack, managed to get his craft turned around and headed for home. Ingalls followed, determined not to lose his prey. Somewhere in the back of the young American's mind the thought that he was being drawn further and further into enemy territory may have occurred. If so, he ignored it. For months he had been awaiting this moment and no amount of cautious reasoning could have induced him to give it up.

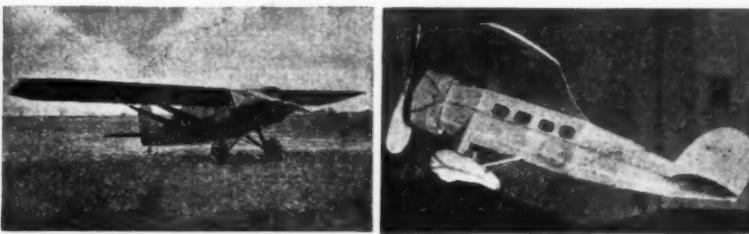
On they roared, zigzagging through the sky, pursuer and pursued. Giving his tiny scout all she could take in one final burst of speed, Ingalls came close enough to the other plane to direct carefully a few bursts of gunfire. Suddenly a puff of black smoke emerged from the German followed by tongues of flame until the craft was a flaming comet headed for the ground and destruction. The youngster who had dreamed, at Yale, of fighting his country's battles in the sky, was on his way to becoming an ace.

Shortly after this, Ingalls' squadron engaged in a daring and clever maneuver. Daylight had not yet streaked the sky and their field was still shrouded in darkness when they took off on a secret flight. Up, up, up they climbed until the air about them had a numbing chill and far over the edge of the horizon they could see the golden fingers of the sun. Below, all was dark. When they had reached the altitude agreed upon for their rendezvous, they fell into V formation and with their engines shut off started a long, silent, ominous glide into enemy territory.

(Continued on page 43)

COMPARE - THESE QUALITY PLANES SEE A REAL DIFFERENCE

You will then understand why Madison Models are the best buys Quality for Quality—Price for Price



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Contains the around-the-world "Winnie Mae" and the "Transatlantic Bel-lanca." Both 15" wing spans. Kit contains full size plans, bulkheads, large tube of cement and all other materials needed to complete these two wonderful models. Get yours now.

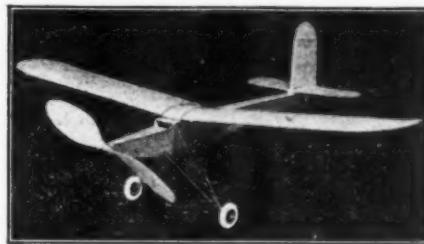
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WITH DUMMY
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Size of Cowling:
Diameter, 3"
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Outdoor Cabin Tractor One of the snappiest flying models in its class, proper engineering and all balsa construction does it. This plane has a double surfaced, high lift wing, 30 inch span, all balsa fuselage, extra strong landing gear to withstand the shocks of outdoor flying, and a large, wide-bladed propeller to keep it up for long endurance flights. The Kit contains complete plans and instructions, stamped ribs, large tube cement, 1 oz. bottle clear dope, pair celluloid wheels, and all materials needed to complete the model. Price

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Our Balsa Wood is the lightest and best balsa we have. It is clear straight grained wood cut to convenient sizes.

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3/16 x 3/16 .02 5 for .09
3/16 x 1/4 .02 5 for .09
1/4 x 3/8 .03 5 for .12
1/4 x 1/2 .03 5 for .18
1/4 x 1/2 .04 5 for .22
3/8 x 3/8 .05 5 for .25
5/8 x 1/2 .06 5 for .25
1/2 x 1/2 .08 5 for .30
1 x 1 .17 2 for .30

40" Strips

1/8 x 3/8 .04 3 ft. for .01
1/8 x 1/2 .04 3 ft. for .01
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Sheet Balsa

5/4 1/32 x 26 .01
16 x 6 x 36 .05
1/16 x 6 x 36 .05
3/16 x 6 x 36 .09
1/4 x 2 x 36 .11

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5/4 diam.—Pair .06

1/16 diam.—Pair .06

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Bushings 4 for .02

Dummy Radial Engines

Celluloid, 9 cylinders, 3

in. diam. Each .36

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1/2 x 3/4 x 5 .3 for .04

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3/4 x 11/8 x 11 .06 .005 per ft.

7/8 x 11/2 x 11 .07 .005 per ft.

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Dowels

Straight-grained genuine

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ing sizes:

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TONKIN straight-grained,

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1/8 x 3/8 .02 5 for .09

1/16 x 1/16 .01 7 for .05

1/16 x 1/8 .01 7 for .05

1/16 x 1/4 .01 6 for .05

1/8 x 1/8 .01 6 for .05

1/8 x 1/4 .02 5 for .09

1/8 x 3/8 .02 5 for .09

1/16 x 1/16 .01 7 for .05

1/16 x 1/8 .01 7 for .05

1/16 x 1/4 .01 6 for .05

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1/8 x 1/4 .02 5 for .09

1/8 x 3/8 .02 5 for .09

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1/16 x 1/16 .01 7 for .05

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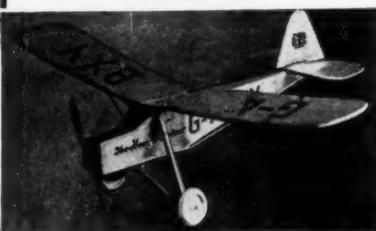
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Capt. Mollison's PUSS MOTH

"The Heart's Content"



14" FLYING MODEL. A new sensation, and the easiest model to build. A most complete kit containing all necessary material with plans and instructions to make this flying model of the transatlantic ship. Be among the first to fly this internationally known plane.

99c
postpaid**Thompson's Trophy Winner GEE-BEE**

Doolittle's Speed Record Breaker. Complete kit to make a perfect flying scale model. Gee-Bee. Easy to build. You must see how beautifully this model flies to appreciate it. Wing span 14". postpaid

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The plane that made the new transcontinental record at the National Air Races. A magnificent model. Complete kit includes everything to make a perfect 14" flying model.

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10 inch
Solid Models
Complete with semi-finished propellers, finished wings, finished fuselage, with drilled cockpits, finished stabilizers and rudders, with full size blueprints, glue, and everything else required. (Lockheed) Sirius kit contains finished pontoons—Lockheed Vega and Sirius Land Plane Contain semi-finished parts and finished wheels. Price per kit for these solid models, 99c each Postpaid.

Remit by Check or Money Order. Add 15% to Foreign Orders.

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HAVE YOUR CLUB PINS OR CLASS WEAR

If your club or class hasn't got pins, get busy right now. 35 cents will buy a dandy pin. Design to suit every taste and requirement. Our big new 1933 catalog shows over 200 hand-made styles, many illustrated in colors. It's Free. Write today!

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BASTIAN BROS. CO.
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Model Airplane Material

Five large sheets of colored Japanese tissue 20 x 21". Both sides of various sizes, rubber band and other supplies. Includes our price list. All for 25c, five bundles for \$1.00. Postpaid.

Aero Shop, 3050 Hurlbut Avenue,
Detroit, Mich.

A Pioneer Makes Good

(Continued from page 37)

The British Air Ministry, designing its first machine, had to learn anew the lesson of flexibility in blades. Its engineers insisted upon stiffer and more rigid blades. Two hundred feet up two blades gave way with a loud crack. Down, down the machine came. The force of the hard landing, made partly on a wooden structure, tipped the machine over and drove the undercarriage clear through the fuselage.

But the pilot stepped out with nothing worse than bruises. Thus was safety proved. Several Autogiros were ordered—with flexible wings. And by now the young inventor was so confident that he began to fly his machines himself, though he had never become a pilot. He made no flights of distance, till suddenly he resolved to make a real trip.

So on September 18, 1928, with a French editor as passenger, he took off from England, heading out across the English Channel. It was rather nervy for the Channel was rough, as was the air. A landing would have been fatal. At nearly a hundred miles an hour—top speed had been increasing—they whirled above the white-caps.

The machine seemed to smooth out the air bumps. Soon they were across. Cierva picked up a railroad and followed it to historic Le Bourget field, near Paris. It was not long after Lindbergh's famous flight. Tens of thousands raised their voices and eyes to the sky as the pilot cut his motor, several thousand feet up, and floated down "like a maple leaf drifting leisurely earthward."

Two days later an American reporter was "taken for a ride," and a surprising one. Taxiing over the field, they felt a jar. They took off and made a few turns. The landing was anything but gentle. The reporter heard something crack. The left wing snapped off as the wheel sank down. Two blades were clipped off. A third dangled. The fourth dug itself in and supported the ship. The prop was clipped.

The shaken reporter and the pilot climbed out. They learned that a cable on the landing gear had struck a stake and broken, weakening the left wheel. Cierva had guessed the trouble at once. The reporter telegraphed his story, pointing out that such a landing with a fixed wing plane "would surely have resulted in splinters and possible explosion." Neither Cierva nor the reporter was injured in the least. In a few days the machine was whirling again. Around the British Isles and the Continent it whirled, 3,000 miles without trouble.

LATE in 1928, Harold Pitcairn brought an Autogiro to the United States and took over all rights in this country. He developed a clutch to utilize the motor for bringing up the rotor to 120-150 r.p.m. in about half a minute. Thereafter the rotor turns freely in the air.

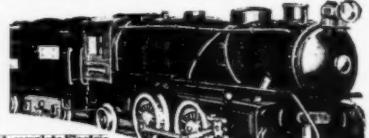
Many other mechanical improvements have been made, from ball and roller bearings for rotor to enclosed cabin, longer vanes, long-travel shock absorber. Small fixed wings replace the early flippers, with dihedral and upturned tips to increase lateral stability and give effect of high fin area.

(Continued on page 42)

DIRIGIBLE 25c

Complete DIRIGIBLE for only 25c. All ready to blow up. Ready to fly three minutes after received. Nothing to construct or assemble. Three-blade propeller all ready made. Flies in or out of doors. Stateside and abroad. Many models. Many different shapes. Zephyrus and balloons. Many exciting stunts can be performed. Complete, including more to pay or buy, 25c. Five for \$1.00, postpaid.

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ELECTRIC TRAIN 25c

A complete Electric Train for 25c. You only 25c extra will add you all of the parts necessary for complete construction, together with full printed instructions and operating rules. Just a few minutes to completely assemble. Requires no tracks nor transformer—a big saving. Runs equally well indoors or outdoors. Runs on dry batteries. Does not eat up little children. Safe over the Rockies can be made. Send complete for only 25c or 5¢ extra postpaid. For 25¢ extra we will send a cover as shown in illustration, driver, 3 passenger cars, observation car, dining car, cook car, baggage station, baggage truck, waiting booth, bell, horn, whistle, lights, semaphores, two rail-way crossing signals, which can be controlled by electrical experts so anyone can understand it. 64 pages, 100 illustrations.

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AAA BALSAL WOOD

24 SHEETS

24 PLANKS

1/6x2' (04)	x3' (06)	x4' (10)	1x2x24	15 x36	23
1/3x2' (03)	x3' (05)	x4' (10)	2x2x24	25 x36	38
1/6x2' (03)	x3' (05)	x4' (10)	1x3x24	20 x36	31
1/8x2' (04)	x3' (06)	x4' (10)	2x3x24	30 x36	45

24 Polished Strips

PROP BLOCKS

1/32x1' 76"	15 for .05	1/2x1x6	.01	1x1/2x12	06
1/6x1' 16"	15 for .05	1/2x1x8"	.02	1x1/2x14	07
1/6x8' 8"	15 for .05	1/2x1x8"	.03	1x2x10	08
1/8x1' 4"	15 for .05	1/2x1x8"	.04	1x2x12	10
3/32x3' 32"	15 for .05	1/2x1x12"	.05	1x2x14	10
1/8x1' 8"	15 for .05	20x24	White Hakone		09
1/8x1' 4"	10 for .05	21x31"	Mino Silk		03
3/16x3' 16"	10 for .05	18x24"	Superfine		06
3/16x1' 4"	5 for .05	Cement (large tube, clear			
1/4x1' 4"	5 for .05	Super Seal)			15

Free Postage. Packing on Orders Over \$1.00

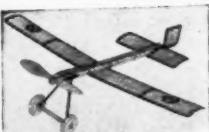
36 lengths are **more** than 24 lengths. 10c Add. Postage

LONG BEACH BALSAL WOOD SYNDICATE, MODEL DEPT.

2485 American Avenue, Long Beach, California

INTERESTING NEWS

about where to buy models, supplies and bargains of all sorts is printed in the Classified Directory on page 48

**READY TO FLY!****25c**

Postpaid

Not a Construction set, but a real Airplane!

This crash-proof 14-inch R. O. G., worth a dollar in stores, only 25c, or 5 for \$1.00! Rises off ground, flies 50 to 200 feet or more. Positively Guaranteed to Fly. Made of best materials; silk tissue, Japanese poplar, balsa, duralumin, etc. Weighs $\frac{1}{4}$ ounce. Agents wanted. No catalog.

Read What Others Say:

"Your Dragon-Fly certainly does ride these Montauk breezes. I have had several 500-foot flights with mine."

"Believe me, it certainly does fly! You are to be congratulated on building such a wonderful little plane."

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"flies to beat the band and will stand an unbelievable amount of punishment."

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"flies perfectly and does everything you claim for it."

Send for Yours Today!

WESTERN AIRCRAFT MFG. CO.
4135 W. Pico
Los Angeles, Calif.

Advisory Board

(Continued from page 19)

attack that gives the greatest lift is usually about 15 degrees. The most efficient angle of attack is between 4 and 6 degrees. There may be exceptions to this rule in the case of airfoils of unusual design.

Question. Please explain how and why a surface added to the underside of an r.o.g. wing would change the lift?

Answer. By r.o.g. wing, I am taking it that you mean a single surfaced airfoil. By adding a surface to the underside, the total effective camber of the wing is reduced. Thus, the lift of the wing at the same speed is less than is originally the case. However, when a surface is added to the underside, a much more efficient airfoil is the result. Therefore, with the same power, the machine will fly very much faster. Due to the added efficiency of the wing and to the greater speed, this double surfaced wing will give more lift than the original single surfaced airfoil, with the same power. Summing up briefly, by using a double surfaced airfoil, greater lift and greater speed may be obtained.

HERE are some questions from Clyde Cook of Burlingame, Calif. It looks as if he intended to get into the flying game in a serious way; if he isn't in it already.

Question. Is it possible for a private pilot to become an instructor of flying?

Answer. Anything is possible provided the person has enough determination. It

will be necessary for the private pilot to pass an examination for transport pilot and then go out and land a job as instructor.

Question. How long does the average airplane last?

Answer. This depends upon so many varying factors that it is impossible to determine the average life of an airplane in general. If you are speaking of transport airplanes, that is one thing; military airplanes, that is another; and commercial airplanes, flown by private individuals, that is still another. The life of an airplane, I should say, depends upon the intelligence of the flyer and how carefully he operates his ship.

Question. Are air bumps close to the ground dangerous to airplanes?

Answer. The air bumps themselves do very little damage to the ship. It is the sudden contact with terra firma that often results in kindling wood, or should I say, twisted metal. Seriously speaking, however, air bumps close to the ground are usually not dangerous to airplanes when the ship is flown by a competent pilot, who takes into account the possibility of air bumps being located at any specific point. Down drafts have caused many pilots to lose altitude upon the takeoff, thus preventing them from clearing telephone wires, trees, etc., at the end of the field, with disastrous results. Therefore, we might say that fields should be long enough to insure against the possibility of such an event taking place. The most dangerous period in the

flight of an airplane occurs at the takeoff and during the first few moments when the ship is climbing. The loss of support at this time causes the machine to drop or to turn over sideways. When it is in such a position, the pilot cannot readily return it to proper balance and flying speed.

J. L. Carr of Dennison Avenue, East, Toronto, Ontario, asks:

Question. Which airfoil is better to use for a low-wing sport model, a U.S.A. 35A, or a Göttingen 387? With the U.S.A. 35A I would sacrifice speed, but with the 387 I would get a fair amount of lift and more speed. (Editor's note: These two sections appear on page 28 of the March, 1932, issue of MODEL AIRPLANE NEWS).

Answer. I would use the Göttingen 387 because it gives a reasonable amount of lift, yet will require less propeller blade area to fly your model properly than the U.S.A. 35A. If the 35A is used, the amount of propeller blade area will necessitate your propeller being extremely large in proportion to the wing. This will make your model look distorted. If a small propeller is used in order that the model have proper eye proportion it will be entirely too small to fly the model correctly. With the Göttingen 387, a smaller propeller may be used and yet retain the proper performance.

Question. In a tapered wing, should the leading edge taper as much, less, or more than the trailing edge?

Answer. What you should do in this case depends entirely upon the effect that you

(Continued on page 44)

FALCON ADVANCED MODELS hold the distinction



MONOCOUP 110

MONOCOUPE FEATURES

Prime Mover—Cell. Dummy Motor—Span Aluminum Ring—Aluminum Cowl Plate—Cell. Balloon-type Wheels—Special Model Airplane Color. Winner of many National Air Race events. The model is a natural record-breaker without the prime mover, but with this marvelous device its performance is practically doubled. Kit for this 18" wing span model contains, besides the special features named, full size detailed drawing, large folder of instructions, and generous supply of material. Kit postpaid \$1.95

of being the most complete ever offered. The reason? We include, besides plenty of grade A material, every known feature and device to make our models the most beautiful and best flying on the market. (Notice Monocoupe features.)

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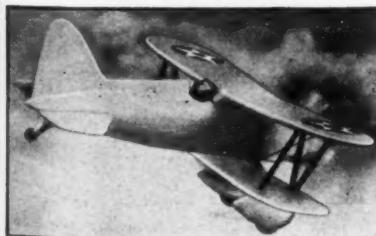


LOCKHEED ORION

When our models are placed upon realistic backgrounds, it is practically impossible to tell them from the real ships.

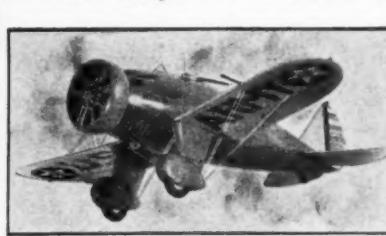
Fastest and most modern commercial plane—the Lockheed Orion 200-mile-an-hour super transport. 18" wing span model faithfully reproduces its original both in appearance and flying ability. Kit contains such features as prime airplane color, full size drawing, detailed instructions, and plenty of material. Kit postpaid \$1.95

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These 9" wing span, flying scale models use a new type of construction, making them easily built and practically non-breakable.

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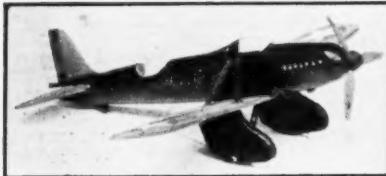
Curtiss Hawk P.G.E.	Hawker Fury
Akron Fighter	Curtiss Hell-Diver
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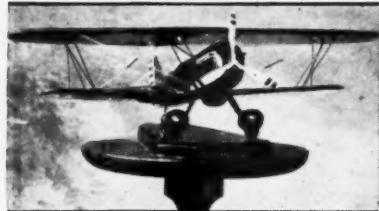


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BEAUTIFUL fine detailed true scale models of the CURTISS HAWK, FALCON, and FALCON AC-3. These models are authentic miniature reproductions of the prototype, carefully designed and constructed to bring out the finest detail. Each an art-piece of rare beauty and distinction.

The wings and control surfaces are of specially treated solid balsa, with natural rib markings, and edges of bamboo and wood frames, covered with a glossy drum-tight covering. Cowlings are also of polished balsa. Many little features, such as a dummy instrument board, radiator shutters, scalloped trailing edge of the wings, etc., give these models a most realistic appearance. The super-streamlining of the Hawk's wing gear housing and landing fairing is carried out to the finest detail. The entire model is carefully hand finished in special gloss lacquers.

These models are unconditionally guaranteed to be exactly as represented.

CONSTRUCTION KITS are unusually complete, including all necessary material, balsa wood, bamboo, large quantity of dope for sealing the wood, cement, fairing filler, special gloss lacquers, yellow orange, red, blue, silver, etc., covering material, music wire, special cockpit lining braid, instrument boards, wheels, pins. Also a detailed three-view, full-size drawing, pattern layout, and full instructions.

Completely finished, Curtiss Hawk P-6-E, with base board, \$20.00 each; Curtiss Falcon, \$20.00 each; Curtiss Falcon AC-3, with baseboard, \$20.00 each; Curtiss Hawk P-6-E Construction Kit, complete, \$3.50 each; Curtiss Falcon AC-3 Construction Kit, complete, \$3.25 each.

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A Pioneer Makes Good

(Continued from page 40)

After twelve years of unremitting toil Cierva has produced at last a machine which attains an air-speed as great as one hundred miles an hour, while the landing speed is little or nothing: has produced a non-stalling machine, with controls always effective.

Recently a man jumped from a plane with a parachute; alongside was an Autogiro, in which the engine was stopped. Side by side the man and Autogiro floated earthward. The machine was last to reach the ground. Landings have been made on docks, even large lots, streets and highways, and take-offs also. Perhaps future villages will have community plots for commuters' landings and take-offs. Huge transports, aerial taxis, hovering bombers, ambulances, exploring craft, have all been built or are planned for the future.

Autogiros have sought jungle-covered Maya ruins, have flown from coast to coast, have been used for taking photographs, news gathering, army and navy tests, traffic study. Amelia Earhart flew one to 18,000 feet; W. T. Campbell, at Boston, to 22,000 feet. Windmill planes have delivered mail to steamers, found big game and lost flyers. On October 13, 1931, one was loosed without difficulty.

Thomas A. Edison, near the end of his career as the world's greatest inventor, visited Newark Airport to see an Autogiro flown.

"Flexible! That's the trick," he said, feeling the blades. "That's the only way to avoid gyroscopic action."

James G. Ray, pilot, fluttered to a landing without forward roll. The aged inventor gasped.

"By gosh!" he exclaimed, "you have them so now that they'll do anything but chew tobacco!"

Always skeptical, he had the landing repeated. He was convinced.

"That's the answer!" he cried, with all the enthusiasm of the boy he had always been. "That's the answer! That's the kind of planes we've got to have."

Be that as it may, that young engineer has brought a new principle to aviation. As President Hoover said, when presenting the Collier Trophy to Mr. Pitcairn and his engineers:

"Its ability to rise and descend with safety almost vertically makes it a practical and decided step forward."

The Autogiro is the only plane that ever made a landing and a take-off on the White House lawn. Perhaps the day is not far distant when it will land and take off on every man's lawn.

How Well Do You Know Your Airplanes

(Continued from page 8)

97th Street, New York City.

These first two young men had perfect entries. Gigante, however, made a very minor mistake in the designation of the Boeing P12B.

We will be very pleased to hear from any of the winners. They will receive their awards very shortly.

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1/8 x 3/16 .08 for .05	1/8 x 2 .25 for .19
1/8 x 1/4 .07 for .05	3/16 x 2 .25 for .15
1/8 x 1/2 .06 for .05	1/16 x 2 .25 for .22
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Page-Nancy Rour

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Howards IKE

Stratasphere Plane

War-Time Fighter

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Flying the Front

(Continued from page 39)

WHAT an experience this was for the American lad who, in spite of having brought down his first plane, was still a novice. Dawn was breaking; the sky was coldly gray. Like great hawks whirling down on their prey, were the shapes of his companion planes. The accustomed cheerful roar of the machines, which is music to an aviator's ears, was gone. The only sound was the eerie whine of the wires.

In back of them they could hear the guns of the front line. Ahead, dimly discernible through the morning mist, were a few glimmering, incautious lights. There was their destination. Lying tranquilly below them was the enemy airdrome at Varsenaere where the Germans considered themselves far enough back of the lines to be fairly safe.

The leader raised his hand. The signal they had agreed upon back at the headquarters of No. 213! Opening wide their throttles, they dived full upon the sleeping camp, letting loose a hail of bombs and machine guns. Men fled in every direction and when they at last turned back to their base, the Squadron had the satisfaction of knowing that their repeated dives, each one bringing a new rain of bombs and machine gun bullets, had done considerable damage to German hangars and planes. For his work in this raid, Ingalls was made a Flight Commander.

Scarcely a month later while leading a section of five Camels in a twenty-plane-formation, he attacked the airdrome at Uyerke at daybreak. The strafing performance of a few weeks before was repeated much to the chagrin of the Germans. However, the enemy succeeded in filling the air with machine-gun bullets and anti-aircraft shrapnel. It was not strange that at least one of the attacking planes should be hit in the heavy barrage through which they flew. Fate decreed that Ingalls' plane should be the target for a steel-capped projectile.

A forced landing in enemy territory was imminent. Ingalls afterward said, "My engine cut out, hitting at most on three cylinders. I started on a gentle glide, looked at the gauges and switches, and tried running on the gravity tank, but no luck. So I looked around for a smooth field from an altitude of five hundred feet, and in the midst of Archie bombs."

All seemed lost when suddenly his engine began to pick up and finally pulled him to the safety of a cloud bank through which his companions had disappeared. Forging on through, he found one of his squadron mates who joined up with him. Gleefully he waved to this friend, and in his delight rocked his little plane from side to side.

To most men, this would have seemed enough excitement and suspense to last for many a long day. But the eventful flight was not yet through. Pursuing a southerly course in a manner suggesting that it had business to attend to, was a Rumpler two-

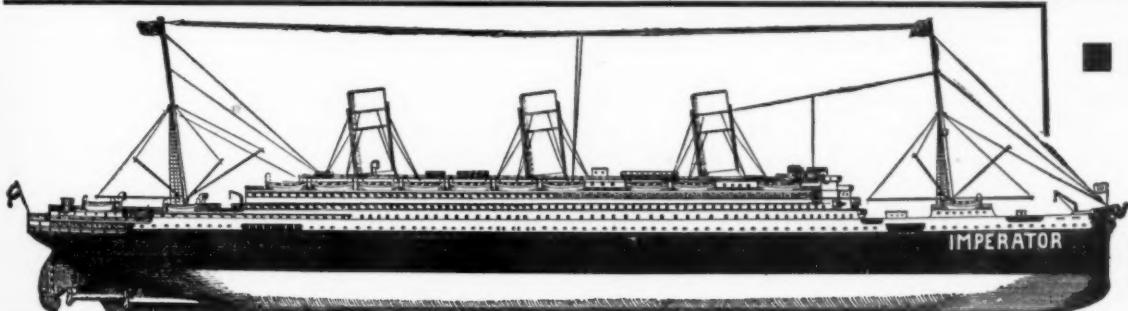
seater. Ingalls shifted his course on the instant, and with his companion scout following, they hastened to overtake the German and soon found themselves in one of the liveliest of dog-fights.

The German was clever and from the first it was evident that the contest would be no easy matter in spite of the fact that the enemy was outnumbered. The Allied single-seaters worked well together, keeping a steady, alternate fire on the Rumpler. But the tricky German, twisting, diving, rolling, managed to elude them for a time while the rear machine gun was a constant menace. However, the shifts of fortune in an air-battle come without warning. Suddenly, the German, nose-down, started diving. Thinking that he had had enough and was attempting to get out of the conflict, the two scouts kept on his tail. But the Rumpler never came out of the dive, crashing on the beach at Ostend. Saluting a brave enemy, Ingalls and his squadron mate at last made their way back to the base.

THREE days later in company with two British pilots, Ingalls attacked an observation balloon near La Barriere. These great bags were generally well protected by a nest of "archies." The feat was not so much to get the balloon as to get it and get away afterward. As the three airmen approached this particular "sausage," the Germans began hauling it in rapidly. The scouts did not falter. It was necessary for

(Continued on page 46)

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The model pictured above built by Herman Lieberman of Norwich, Conn.

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Aerodynamic Design

(Continued from page 38)

perpendicular to the fuselage or body of the airplane. See Fig. No. (41).

The foregoing discussion refers to a wing that has the same length of chord throughout its entire span. If the wing is to be of the tapered type, however, the angle of sweep back should be measured between a line running through the apex of the (V) of the wings and one drawn through the points that are back of the front edge of the wing, a distance of $1/3$ of the respective chord lengths. Fig No. (42). This figure shows a tapered wing with a 20 degree sweep back on each side.

The most efficient results from a sweep back are obtained when a low center of gravity is used in conjunction with it. We have heretofore assumed that the center of gravity is high, when the line of thrust is very close to the wing center section. This is often, but not always the case. It may be considered low when the center of gravity is a distance of $5/100$ of the wing span, below the wing, in the case of swept back wings. An accurate checkup may be made by balancing the ship on its side, shifting the point of support until the point of balance (center of gravity) is found.

If the center of gravity is $5/100$ of the wing span below the wing, the required amount of sweep back of the wings is just half of the amount necessary for cases in which the center of gravity is high. For instance, let us suppose that the span of the wing is 25 inches measured from tip to tip. The center of gravity is $1 \frac{1}{4}$ inches or $5/100$ of the span below the wing. Then the center of gravity is "low." So instead of a twenty degree sweep back on each wing being necessary, only ten degrees is required. (One degree equals a displacement of $1/16$ inches in a length of four inches.)

As less sweep back can be used in conjunction with a low center of gravity, the tendency to spin is diminished. This combination is therefore recommended.

Next month we will continue our discussion of lateral stability and show you the method that will give you the best results. (Note:—In the October instalment of this article, we wish to make a correction of one value given in tables No. 1. In the series of tables in which (d) equals $7/8$, the value of (13.5), given in column four for 8" diameters, should be (12.5).

A Miniature Airport

(Continued from page 33)

to work out in detail.

The most exact method might be to place a piece of tracing paper over the picture and trace the plan of the airport on it. After this is done, you will have a distorted figure. This, however, may be readjusted and drawn to suit your convenience. For instance, the right hand line which represents one boundary of the airport will not be at right angles to the boundary which is nearest to your eye. Take a point at the center of this line and swing the line around into proper position. The distortion of course is due to the fact that the camera was not directly above the airport when the picture was taken.

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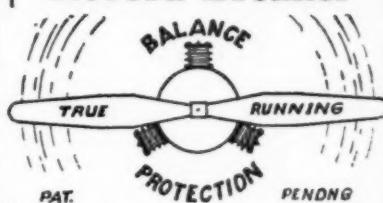
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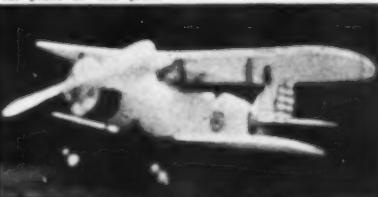
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This snappy ready-to-action 2-foot wing span model of the latest United States Army pursuit plane, comes to you completely constructed, with Army insignia, 1 mm. air-cooled radial engine, drag ring, pilot's cockpit, adjustable control for straight flight or circles, fast realistic flights averaging 300-500 feet. Flight guaranteed.

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The Choice of
CHAMPION MODEL BUILDERS

Clear, White, Sheet Balsa

1/32 x 2 x 24"....4 for .10 1/4 x 2 x 24"....2 for .10
1/16 x 2 x 24"....4 for .10 3/8 x 2 x 24"....2 for .10
1/8 x 2 x 24"....4 for .10 1/2 x 2 x 24"....2 for .10

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1/16 x 1/16 x 24"....30 for .10 1/8 x 1/8 x 24"....20 for .10
1/16 x 1/8 x 24"....30 for .10 3/16 x 3/16 x 24"....20 for .10
1/8 x 1/8 x 24"....25 for .10 1/4 x 1/4 x 24"....15 for .10

Propeller Stock

5/8 x 1 x 24"....05 | 1 x 1 1/2 x 24"....10
5/8 x 1 1/2 x 24"....05 | 1 x 2 x 24"....10

Japanese Tissue and Cement

Imperial Tissue size 20x24", 10 for .20. Japanese Mino Silk Tissue, 21x21", 10 for .30. Lightest Tissue Made, extra thin, 18x24", ea. .05. Superseal Clear Cement, large tube, ea. .15.

10% Postage and Packing*Minimum Order \$1.00*

AERO MODEL RESEARCH LAB.
Box 1051, LONG BEACH, CALIF.

The New BEN-SID 5-in-1*Complete with all material to make 5 perfect planes.*

65¢
Postpaid



This kit contains a fuselage, a main wing, a rudder, a tail fin, a propeller, plans, sandpaper, cement, sandpaper, plans and even colored paper—everything to complete the five 5" perfect miniature scale replicas. Traveler, "Mystery Ship", Fairchild, "Auto-Go", and "Bomber". "Cloudboy". Order a few BEN-SID kits now for Xmas gifts. Send for free details.

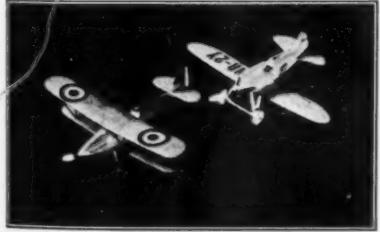
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Remit by money order or check.

BEN-SID Aircraft Co., 182-3rd Ave., N. Y.



Big 3 Ft. Telescope 5 sections. Brass bound. 10-mile Moon, Stars & distant objects with this powerful x-1 instrument. Special Eye piece for viewing Sun included. **FREE**. Makes an ideal Microscope. Guaranteed. Big value. Postpaid \$1.75. C. O. D. 15c extra.

BENNER & COMPANY, T-74, Trenton, N. J.



HAWKER FURY 6" wing span HOWARD RACER 5 1/4" wing span

PETITE SOLID SCALE MODEL KITS**25¢ each, Postpaid in U.S.**

These are real Engineered Kits and contain Complete insignia and finishing material. Contests Winners.

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12" F-9-C-2 Akron Fighter \$1.00 Each
15" Howard Racer Postpaid

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in flying events, with Utzinger taking one second place.

In the outdoor flying scale event at the Fair Meet, Houdehell flying a Fokker D-7 made between 900 and 1000 feet distance. In the indoor events, time made was almost 5 minutes despite hanging decorations, a crowd of about 5,000 people and a building as drafty as outdoors, due to the fact that every window and door was open.

About 100 contestants from all parts of Ohio took part in the State Fair Meet.

Youngstown, Ohio, Becomes Air-Minded

WE recently have had a letter from William Beerstein, telling us that a new model airplane club is being organized at the Youngstown Y.M.C.A. He says:

"We are inviting all boys in Youngstown and vicinity who are members of the 'Y' to join. The purpose of our group will be to promote model airplane activity and to study model airplane design so as to produce real record smashing models. The club expects to hold contests regularly, one very four weeks, and members will be given the opportunity to fly their models after each meeting. There will also be competition to determine the standing of the members—the member flying his model longest will be awarded the highest rank, etc. All boys will be required to pass a Baby r.o.g. test of 30 seconds flight before becoming full fledged members."

"We want all Youngstown model builders to turn out. Get any further information at the 'Y' Boys' Division."

Loper Takes It

UNQUESTIONABLY, some of our readers will remember Robert Loper, who has been a contributor to our columns. Mr. L. P. Dittemore of the Topeka, Kansas, Model Airplane Club, sends us the following information about this enterprising young man:

"Scoring 17 out of a possible 20 points, Robert Loper, Topeka, captured the Kiwanis club trophy for all-around excellence for entrants under 21 years old, in the state miniature airplane tournament.

"Loper's planes captured a second in outdoor duration with a flight of 3' 47.4": third in outdoor gliding with 8.7": first in indoors duration with 4' 43", and first in indoor fuselage model, with 3' 17.2"."

Clifford Mesenheimer, Lawrence, and Elva Jean Dittemore, Topeka, tied for second in the trophy competition with 5 points each. The trophy is a silver airplane mounted on a base of black and silver, with engraved plate.

Model Gossip

THERE were many of our expert model builders who were not fortunate enough to be able to attend the Fifth National Model Airplane Contest held recently at Atlantic City, N. J. One of the outstanding features was the flight of Joe Kovel's indoor model, which won with the time of 13' 3". We thought possibly that some of our readers might be interested in knowing the specifications of Kovel's ship, so here they are:

Wing area: 121 square inches.
Propeller diameter: 15".
Propeller weight: .65 grams.
Slack: 4".

(Continued on page 48)

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1/16 x 1/8 x 22" for .05	1/16x1.4x15" each .01
1/16 x 1/8 x 20" for .05	1/16x1.4x15" 12 for .08
1/8 x 3/16 x 10" for .05	2 ozs. .07
1/8 x 3/16 x 10" for .05	4 ozs. .13
1/4 x 1/4 x 10" for .05	Plnt. \$1.40 Quart. .75
1/2 x 1/4 x 8" for .05	Colored Dope
1 x 1 x 1 for .06	White, Red, Blue, Yellow, Orange, Olive Drab, Black, Green.

1/16 x 1/16 x 25" for .05	Bamboo
1/16 x 1/8 x 22" for .05	1/16x1.4x15" each .01

1/16 x 1/8 x 20" for .05	Clear Dope or Thinner
1/8 x 3/16 x 10" for .05	2 ozs. .07

1/8 x 3/16 x 10" for .05	4 ozs. .13
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1/4 x 1/4 x 8" for .05	Plnt. \$1.40 Quart. .75
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Japanese Model Airplane Tissue, 32 colors, also Wood Veneer. Send for samples. See our ad. this paper with Jap. Girl's Face, Whitfield Paper Works, Importers, 12 Vestry Street, New York City.

We manufacture and distribute model airplane supplies exclusively for model concerns. Model Aero Supply Mfg. Co., 185 St. Johns Place, Brooklyn, N. Y.

12" Flying Twin Pusher Kit, 25c postpaid. Canada 35c. All parts complete with plans and instructions. See our Free Offer on page 47. Universal Model Airplanes, 1526 St. Johns Place, Brooklyn, N. Y.

20" Flying Scale Puss Moth Kit, \$2.50. Crescent Model Aircraft, 1805 Benson Ave., Brooklyn, N. Y.

GIVEN: "Gee Bee Super-Sportster" Model Airplane. Actually flew! Early earned Circular FREE. R. P. Lundberg, Box 415, Minneapolis, Minn.

Model Building Services. Models custom built from kits. Cleveland Models a specialty. Send stamp for list. Frank T. Roberts, Jamesburg, N. J.

Small scale models expertly made to order. Fine Christmas gifts. William Snow, Box 521, Pawtucket, R. I.

Get our blueprints for building 6" ornamental scale models. Lockheed Vega, Lindbergh Lockheed, Hawk's Travelair, Monomail, Ford Trimotor, Bellanca Airbus, Pacemaker, Condor, Army O-1 and P-6, Boeing Pursuit, Pace Racer, Northrop, Great Lakes, Stearman, Price 20¢ each; six for \$1. Popular Model Airplane Co., Box 81, Des Plaines, Ill.

Model Plans for all types in the Jumbo Folio, 48c. Get our plan list NOW. Viking Aircraft Co., Box 286, Hamilton, Ohio.

New! Model Airplane Engines, fast, powerful, speedy. For all sizes. Model Airplanes. Runs from 10 to 15 minutes. Write for full information. Washecka, 25 Greenridge Ave., Garden City, New York.

PATENTS AND INVENTIONS

Unpatented ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 957 Barrister Bldg., Washington, D. C.

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Watch Camera, "Every Tick a Picture." Complete outfit, \$3.99 postpaid. Send for Bargain List. Thousands of cameras at half and less. G. Gennert, Inc., 20 W. 22nd Street, New York City.

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HAVE YOU DECIDED

what you want for Christmas? The December issue of UNIVERSAL MODEL AIRPLANE News will contain scores of good suggestions in the form of Christmas announcements of models never before on the market. Remember, UNIVERSAL MODEL AIRPLANE News can help to get you the present you want. Show the magazine to your mother and dad and let the advertisements sell them the gift you want.

DON'T

OVERLOOK THESE REAL VALUES

18" Balsa Strips Para Rubber
1/16" x 1/16" 23 for \$0.05 .015 23 ft. .06

1/16" x 1/8" .22 for .05 1/8" flat 23 ft. .07

1/16" x 3/16" 20 for .05 1/16" square 23 ft. .09

1/8" x 1/8" .10 for .05 3/16" square 23 ft. .11

1/8" x 1/4" 10 for .05

18" Sheet and Plank Thrust Bearings

Small or large, 1 oz. .15 Washers

1/16" x 2.....7 for .10 1/4" dia. dia. 0 1/2 gr. .10

1/16" x 2.....7 for .05 1/4" dia. dia. 0 1/2 gr. .10

1/8" x 2.....5 for .10

3/16" x 2.....4 for .12

1/4" x 2.....4 for .15

1" x 2.....1 for .15

2" x 2.....1 for .20

2" x 2.....1 for .22

For 36" length double 2 oz. .15

18" length cost. 1 pt. .50

Propeller Blocks Japanese Tissue

5"-.16" x 2.....8 for .05 Jap. Tissue ... 2 for .05

6"-.16" x 2.....8 for .05

7"-.16" x 1.....3 for .05

8"-.16" x 1.....3 for .07

10"-.16" x 1.....2 for .07

Celluloid Parts

.05 1/16" red 05 6 ft. .03

.07 1/16" diam. 09

.09 1/16" diam. 12 for .08

.12" cyl. motor 28

.14" cyl. motor 17

.22" cyl. motor 20

No orders under 50¢. Add 15¢ for parking and postage to orders under \$1.50. Orders over \$1.50 add 10 per cent. When ordering 36" lengths add extra 10¢. Money Orders Preferred.

MERCURY MODEL AIRPLANE CO., Dept. 4

4502 Lincoln Place Brooklyn, New York

KNOWLEDGE AND PHILATELY

Stamp collectors enjoy many advantages in the matter of gaining all kinds of useful knowledge without any special effort in that direction. Almost any page selected at random in the stamp album will reveal the names of celebrities in World History, Commerce, Zoölogy, Aviation Development, and other important facts concerning the various countries of the world.

How many of our readers know that a section of the Panama Canal is known as the "Gaillard Cut." This is shown on a very beautiful set of stamps issued last year for the Canal Zone. The design shows a steamer passing through the Cut and an airplane overhead.

Do you know what are the principal industries of the Columbian Republic? The answer is pictured on a beautiful set of Air Mail stamps which was issued a few weeks ago. The largest industries of this South American Republic are: Cattle, Coffee, Bananas, Oil, Gold, and Emeralds.

Can you name the Lindbergh of Mexico? If not, all you have to do is look up the 1929 Carranza Commemorative issue which has a splendid photograph of Capt. Emilio Carranza, together with his plane "Mexico Excelsior." It also gives the date of his birth and death.

Italy enjoys the distinction of having been the first country to issue an Air Mail stamp. It was issued on May 22, 1917, for an experimental Air Mail flight, between Rome and Turin. This country has shown a very liberal disposition in honoring its poets and artists as well as patriots including Ferrucci, Dante, da Vinci and Garibaldi.

In December, 1930, the Central American Republic of Salvador issued a set of four stamps in honor of Simon Bolivar, the George Washington of South America. Simon Bolivar was responsible for the liberation of Colombia, Venezuela, Bolivia, Ecuador, and Peru and his influence was felt throughout all of South America.

These are just a few facts which occurred to me at the moment but the subject is almost unlimited.

It will astonish you how much you can learn from your stamps.—L. W. Charlat.

Air-Ways

(Continued from page 47)

Winds put into motor: 1400.

Tail boom (overall): 12".

Fin: 4"x4" tapered to 2 1/2".

Sinking rate: .166 meters second.

Wing span: 32 inches.

Propeller block: 15"x1 1/16"x1 5/8".

Motor: 1-8"-30 special rubber.

Weight: 2.3 grams.

Winds ship came down with: 30.

Stabilizer span: 12".

Total weight of ship: 6.3 grams.

Gliding angle: 10 plus.

Carl Goldberg, official world's record holder, won third place in the Atlantic City contest, with the time of 12' 38". Carl has done over 14 minutes with this ship but he ran into a little misfortune as the ceiling was fairly low and his ship was designed to take advantage of a high ceiling.

Among the new developments on indoor ships, Carl Goldberg's "tear drop" motor stick "takes the cake." It is a hollowed tapered stick with no bulkheads and only one seam. Its cross-section resembles a streamline or tear drop shape. Here's the way it can be made.

First select a clear light piece of 1-32" flat balsa. Sand a 1"x16" strip of it uniformly down to .025". Taper strip from 5-8" at ends to 7-8" at center. Sand ends down to about .022". Now round two of the edges of a piece of balsa 1-8"x1-4"x17" so that its cross-section is a "U" instead of being rectangular. Soak original strip in very hot water, then bend around "U" beam. Wrap with gauze and put on stove. Heat very carefully until absolutely dry. This will take about 15 minutes. Turn the wood over occasionally. When dry take out and cement seams together. Sand smooth, put in small end plugs, and there you are. A honey of a motor stick.

JEROME KITTEL.

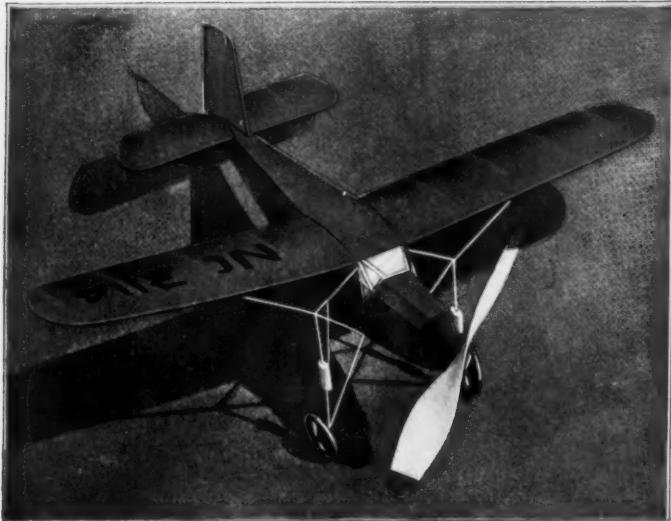
CORRESPONDENTS WANTED

ROBERT OGDEN of 6317-19 Drexel Avenue, Chicago, Illinois, would like to join an organized model club. Will not some enterprising club secretary communicate with him?

If you live in the north central states and want to start a model airplane club, write to one who has done it. Write to Irvine Seath of 5522 France Avenue South, Minneapolis, Minn., and get some good tried and true information. (Editor's note: The editor will be very pleased to know exactly what this information is. Will not Irvine Seath write to Mr. Grant and give him an outline of the formation of a model club. It will be very useful, as calls come for this information continuously.)

James Fairley of 2633 York Street, Vancouver, B. C., Canada, would like short new items that could be used as material for the *Vancouver Sun* newspaper. He is taking care of the model department and is sadly in need of material, which many of our readers might be interested in contributing to him.

If there is anybody anywhere interested in forming a model airplane club, kindly communicate with Bill O'Keefe of 956 North 21st Street, Milwaukee, Wisconsin.

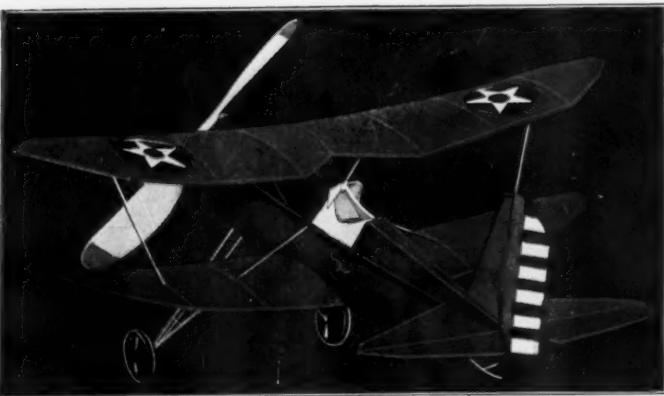


Curtiss Robin—Span: 17½", Length: 14"

NEW ARMY PURSUIT FLIES 1300 FEET!

75¢
Postpaid
or at
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"Your Army C-1-Pursuit made a RECORD Flight for me of 1300 FEET! It was the easiest ship I ever constructed. The plans so EASY to follow!" Clyde Kowalka (Ohio). PROOF that we mean what we say about marvelous FLYABILITY of ALL Comet planes! Look at that color-photo of the NEW ARMY PURSUIT! Then enjoy building, flying this trim, fierce U. S. Army fighter—our own FLYING design. C-1 PURSUIT kit with ALL materials, FULL-SIZE plans, etc., complete in yellow-black box only 75¢ postpaid! See view of Pursuit box and kit contents at right! Then Order! We allow you to order C.O.D.! Send no money—mail the coupon!



C-L-Pursuit—Span: 15", Length: 12½"

SEE OTHER SIDE of THIS PAGE Before You Order — THEN Order Kits On This Yellow Coupon-Side — HURRY!

Send no money—we trust you! Just order C.O.D., just send coupon! Or send money order and we pay postage. If you send check, add 15¢ extra for exchange. CANADIAN: Send 20% extra. Use international money order—ask your postman! Order quick—build these planes that FLY—like thousands are doing!

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Curtiss Robin Baby Bullet The Zipp Dipper Catalog (5c)

New Bates Jr. Celluloid Prop. Size: No. Color:

(PRINT CLEARLY)

Name: _____ Street: _____

City: _____ State: _____

ZIP CODE: _____

FREE! Strasen's New Celluloid Propeller INVENTION Banishes "Prop. Carving"—FREE with each \$1 and \$1.50 Kit! Super-pulling, realistic, already formed! Rates Celluloid Propeller is sensational! Gives BETTER Flights—outlasts plane! Eliminates propeller carving job! (see photo).

Prop. with soft celluloid propeller has prop. base on front and 61.5 kits. Prices ordered separately: 5" .125, 6" .150, 7" .180 each. Colors: Red, green, yellow, chalk white. Order quick!

**ALL Planes Reproduced in
FULL COLORS—Build, FLY 'em!**

NEW! Curtiss Robin FLYING Scale

"Flies 5 Times As Far As My
Dipper!" writes Harry Magni of N.Y.

Gosh! Isn't this new FLYING Scale Curtiss Robin cabin simply beautiful! FLIES 1500 feet—dead easy to build—and costs you only 75¢ postpaid! See how SWELL it looks! swell-like all Comet-crafted models! A COMPLETE kit of ALL materials needed with FULL-SIZE, 3-view plans sent you inside brightly colored cardboard box with new FREE and EXTRAS! Celluloid **Formed Prop!** Only 75¢ postpaid! Order quick! Send coupon—send no money!

\$1 POSTPAID
or
at DEALERS



Span: 14½"
Length: 11"

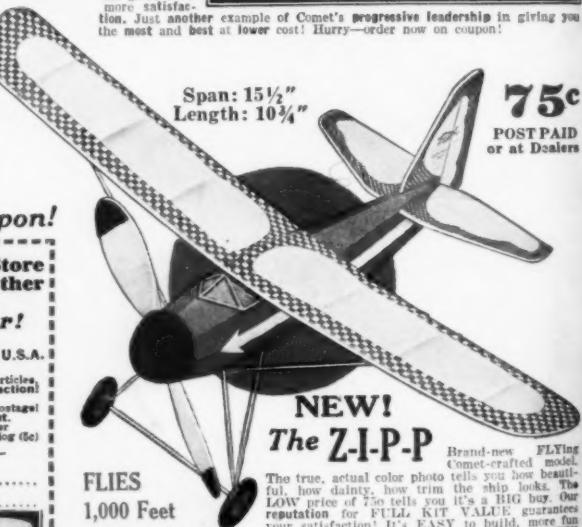
NEW! Heath Baby Bullet!

What a ship! Here's the FIRST FLYING Scale of Heath Baby Bullet ever offered you—and sells at bargain price of 75¢ postpaid! See how SWELL it flies! It's a dream in sight! And EASY to build as ALL Comet-craft! A remarkable value with COMPLETE Kit containing ALL materials, FULL-SIZE, 3-view plans, etc., in big, 2-color box! 75¢ postpaid! Think of it. Look at it. **FLY IT!** Order—use the convenient "send no money" C.O.D. coupon! Comet trusts you!

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PAID**
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Actual color photo (right) shows beautiful yellow-orange box in which you will receive your new Army C-1-Pursuit! View also shows partial contents of kit. Boys, Comet packs ALL kits neatly in beautiful color boxes because we know you appreciate the EXTRA value. Costs us more, but gives YOU more satisfaction. Just another example of Comet's progressive leadership in giving you the most and best at lower cost! Hurry—order now on coupon!



75¢

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Span: 15½"
Length: 10¼"

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Brand-new FLYING Comet-crafted model.

The true actual color photo tells you how beautiful your plane will look. The LOW price of 75¢ tells you it's a BIG buy. Our reputation for FULL KIT VALUE guarantees your satisfaction! It's EASY to build, more fun to FLY! Be first to give your friends a thrill with The Zipp. COMPLETE Kit in 2-color, sturdy box with ALL materials, FULL-SIZE, 3-view plans, etc., only 75¢ postpaid! Hurry, Order! Use Coupon! We trust you—just order C.O.D.

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